



206076

## Second Five-Year Review Report

for  
**Dakhue Sanitary Landfill**  
**Hampton Township**  
**Dakota County, Minnesota**

**March, 2004**

**PREPARED BY:**

**U. S. EPA - REGION 5**

Approved by:

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2-27-04

Date

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## Table of Contents

List of Acronyms .....	5
Executive Summary .....	7
Five-Year Review Summary Form .....	8
<b>I. Introduction .....</b>	<b>10</b>
<b>II. Site Chronology .....</b>	<b>11</b>
<b>III. Background .....</b>	<b>12</b>
Physical Characteristics .....	12
Land and Resource Use .....	12
History of Contamination .....	13
Initial Response .....	13
Basis for Taking Action .....	13
<b>IV. Remedial Actions .....</b>	<b>15</b>
Remedy Selection .....	15
Remedy Implementation .....	15
System Operations/Operation and Maintenance(O&M).....	16
<b>Progress Since the Last Five-Year Review .....</b>	<b>16</b>
<b>V. Five-Year Review Process.....</b>	<b>16</b>
Administrative Components.....	16
Community Notification and Involvement.....	17
Document Review.....	17
Data Review.....	17
Site Inspection .....	19
Interviews.....	20
<b>VII. Technical Assessment .....</b>	<b>20</b>
<b>Question A:</b> Is the remedy functioning as intended by the decision documents?.....	20
<b>Question B:</b> Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?	
<b>Question C:</b> Has any other information come to light that could call into question the protectiveness of there remedy?.....	20
Technical Assessment Summary.....	21
<b>VIII. Issues.....</b>	<b>21</b>

<b>IX.</b>	<b>Recommendations and Follow-up Actions</b> .....	21
<b>X.</b>	<b>Protectiveness Statement(s)</b> .....	22
<b>XI.</b>	<b>Next Review</b> .....	22

#### **Tables**

- Table 1 - Chronology of Site Events
- Table 2 - Annual System Operations/O&M Costs
- Table 3 - Issues
- Table 4 - Recommendations and Follow-up Actions

#### **Attachment**

**Figure 3-16**

**Figure 2-5**

## **List of Acronyms**

ARAR	Applicable or Relevant and Appropriate Requirement
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
EPA	United States Environmental Protection Agency
FSR	Final Site Remedy
HRL	Health Risk Limit
GCL	Geosynthetic Clay Liner
GWOU	Groundwater Operable Unit
MCL	Maximum Contaminate Limit
NPDES	National Pollutant Discharge Elimination
NPL	National Priority List
NOC	Notice of Compliance
O & M	Operation and Maintenance
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCOR	Preliminary Close Out Report
PRP	Potential Responsible Party
PSFD	Pilot Scale Field Demonstration
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act

RD	Remedial Design
RAO	Remedial Action Objective
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SCOU	Source Control Operable Unite
VOC	Volatile Organic Compounds

## **Executive Summary**

A June 28, 1991, Record of Decision (ROD) documented remedial actions for OU1 (source control), including construction of a final cover for the site, and a June 30, 1993, ROD for OU2 (ground water migration) consisted of the installation of additional monitoring wells, institutional controls, and long-term monitoring as a remedy.

The Site achieved construction completion with the signing of the Preliminary Close Out Report on June 30, 1994. The trigger for this five-year review was the actual completion of the first five-year review on March 25, 1999.

The assessment of this five-year review found that the remedy was constructed in accordance with the requirements of the Record of Decision (ROD), the remedy is functioning as designed, source control measures (a Site cap and a vegetative cover over the landfill) has achieved design criteria by significantly reducing both the production of leachate and toxicity of the compounds released from the landfill, and since the cover was constructed, there has been a reduction in the contaminant concentrations in the groundwater.

## Five-Year Review Summary Form

### SITE IDENTIFICATION

**Site name (from WasteLAN):** Dakhue Sanitary Landfill

**EPA ID (from WasteLAN):** MND981191570

**Region:** 5

**State:** MN

**City/County:** Dakota

### SITE STATUS

**NPL status:** Final ☒ Deleted Other (specify) \_\_\_\_\_

**Remediation status** (choose all that apply): ☐ Under Construction ☐ Operating ☒ Complete

**Multiple OUs?** ☒ YES ☐ NO

**Construction completion date:** 06 /30/1994

**Has site been put into reuse?** ☐ YES ☒ NO

### REVIEW STATUS

**Lead agency:** EPA ☒ State ☐ Tribe ☐ Other Federal Agency \_\_\_\_\_

**Author name:** Gladys Beard

**Author title:** NPL State Deletion Process Manager

**Author affiliation:** U. S. EPA, Region 5

**Review period:** 01 /01 /2003 to 12/30/ 2003

**Date(s) of site inspection:** December 2003

**Type of review:**

- ☒ Post-SARA    ☐ Pre-SARA    ☐ NPL-Removal only  
☐ Non-NPL Remedial Action Site    ☐ NPL State/Tribe-lead  
☐ Regional Discretion

**Review number:** ☐ 1 (first) ☒ (second) ☐ 3 (third) ☐ Other (specify) \_\_\_\_\_

**Triggering action:**

- ☐ Actual RA Onsite Construction at OU # \_\_\_\_\_    ☐ Actual RA Start at OU# \_\_\_\_\_  
☐ Construction Completion    ☒ Previous Five-Year Review Report  
☐ Other (specify) \_\_\_\_\_

**Triggering action date (from WasteLAN):** 3/25 /1999

**Due date (five years after triggering action date):** 3 /25 /2004

\* ["OU" refers to operable unit.]

\*\* [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]



## **FIVE-YEAR REVIEW SUMMARY FORM, cont'd**

### **Issues:**

A passive gas venting system is being upgraded to an active gas extraction system. Two new double-walled underground gas condensate tanks will be installed to collect landfill gas condensate. The geomembrane landfill cover will be patched to prevent water and air infiltration into the waste mass. A property boundary fence will be installed as part of the upgrades.

### **Recommendation and Follow-up Actions:**

The work to date at the Dakhue Landfill has significantly reduced groundwater impacts from this closed landfill. Site maintenance and monitoring should be continued to document the ongoing improvements to the shallow groundwater system.

### **Protectiveness Statement(s):**

All immediate threats at the site have been addressed, and the remedy is protective in the short-term of human health and the environment.

### **Long-Term Protectiveness:**

Long-term protectiveness at the Dakhue Landfill Superfund site (the Site) will be achieved by continuing the long-term monitoring of the ground water system. Long-term groundwater monitoring has demonstrated that the concentrations of the chemicals of concern have declined close to or below cleanup goals. Long-term trends show significant and adequate improvements in ground water quality.

### **Other Comments:**

None.

**Dakhue Sanitary Landfill  
Dakota County Hampton Township, MN  
Second Five-Year Review Report**

**I. Introduction**

The purpose of the five-year review is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in Five-Year Review reports. In addition, Five-Year Review reports identify issues found during the review, if any, and identify recommendations to address them.

The Agency is preparing this Five-Year Review report pursuant to CERCLA §121 and the National Contingency Plan (NCP). CERCLA §121 states:

*If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgement of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

*If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

The Minnesota Pollution Control Agency (MPCA) and the United States Environmental Protection Agency (EPA), Region 5, conducted the five-year review of the remedy implemented at the Site. This review was conducted by the Project Managers for the entire site from January 2002 through December 2003. This report documents the results of the review.

This is the second five-year review for the Site. The triggering action for this five-year review is the completion of the first Five Year Review on March 25, 1999. The five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

## II. Site Chronology

**Table 1: Chronology of Site Events**

Event	Date
Removal Assessment	8/09/1990
Proposal to the NPL	10/26/1989
NPL listing	8/30/1990
PRP Search	12/30/1987
RI/FS complete for OU1	3/31/1991
RI/FS complete for OU2	3/31/1993
ROD signature for OU1	6/28/1991
ROD signature for OU2	6/30/1993
Remedial action start for OU1	6/23/1992
Remedial action complete for OU1	3/30/1993
Remedial action start for OU2	8/11/1993
Remedial action complete for OU2	9/09/1993
Preliminary Close Out Report	6/30/1994
Deletion from NPL	7/24/1995
First five-year review	3/25/1999

### **III. Background**

#### **Physical Characteristics**

The Dakhue Sanitary Landfill is located in Section 24 and 25 Township 113 North, Range 18 West, in Hampton Township, Dakota County, Minnesota. The Site encompasses approximately 80 acres, of which 26 acres have been actively landfilled. The landfill began operations in 1971 receiving mixed municipal and industrial solid waste. (See Figure1).

#### **Land and Resource Use**

The landfill began operations in 1971 receiving mixed municipal and industrial solid waste. A solid waste landfill permit was issued to the owner of the Site on October 1, 1971. Dakhue Landfill operated until May 31, 1988, at which time waste disposal activities ceased. Since opening, the landfill has been utilized for the disposal of mixed municipal and commercial waste and small amounts of industrial waste. The landfill was initially opened on a part-time basis until 1973 when the landfill extended its operation to six days per week. It is estimated that 1,500,000 cubic yards of waste were disposed of at this site.

#### **History of Contamination**

Residential wells near the Dakhue Sanitary Landfill were sampled by MPCA staff on several separate occasions. The samples were analyzed for volatile organic compounds (VOCs) by the Minnesota Department of Health. None of the residential wells samples were known to be contaminated.

Results from the analysis of samples document the presence of a variety of compounds. The most common of these compounds are benzene, methylene chloride, cis-trans 1,2, dichloroethene, ethyl ether, tetrahydrofuran and trichloroethene.

There is no discrete source of contamination other than mixed municipal waste at the Dakhue Sanitary Landfill. Most of the waste that was present at the landfill was household trash and garbage. A small quantity of industrial, commercial waste was disposed of at this site. The chemicals detected at the site are consistent with some of the waste streams paint and solvents thought to have been disposed of in the landfill.

#### **Initial Response**

The U.S. EPA funded the MPCA to conduct Remedial Investigation (RI) and Feasibility Study (FS) activities. RI work involves determining the nature and extent of contamination and FS work involves developing and evaluating remedial alternatives.

During the course of those activities, U.S. EPA and MPCA decided to divide the remedy for the Site into two units or discrete actions, referred to as "operable units" (OUs). They are as follows:

OU One: Source control of contaminants from the landfill.

OU Two: Contaminated groundwater migration management.

A focused FS was completed in March 1991 for the first OU and a Record of Decision (ROD) was issued on June 28, 1991 outlining work necessary to address the source of the contamination, the landfill itself.

A RI was completed for the second OU in August 1992 and a FS was completed on March 31, 1993. A ROD was issued on June 30, 1993 outlining work necessary to address the migration of contaminated groundwater.

### **Basis for Taking Action**

#### Contaminants

Hazardous substances that have been released at the Site in each media included:

#### **Groundwater**

Aluminum	1,2-Dichloroethylene
Arsenic	Chlorofoem
Barium	1,2-Dichloroethane
Beryllium	Methyl Ethyl Ketone
Cadmium	1,1,1- Trichloroethane
Chromium	1,2-Dichloropropane
Cobalt	Trichloroethylene
Copper	1,1,2-Trichloroethane
Iron	Benzene
Lead	Methyl Isobutyl Ketone
Magnesium	Tetrachloroethylene
Manganese	Toluene
Nickel	Chlorobenzene
Potassium	Xylenes
Selenium	Tetrahydrofuran
Silver	Phenol
Sodium	p-Cresol
zinc	Benzoic Acid
Cyanide	Di-n-butyl phthalate
Chloromethane	Bis(2-ethyhexyl)phthalate
Vinyl Chloride	
Trichlorofluoromethane	
1,1-Dichloroethylene	
1,1-Dichloroethane	

## **Groundwater**

Benzene  
Carbon Tetrachloride  
Chlorobenzene  
Chloroform  
Cyclohexane  
1,4-Dichlorobenzene  
1,1-Dichloroethane  
1,2-Dichloroethane  
cis-1,2 Dichloroethene  
trans-1,2 Dichloroethene  
1,2-Dichloropropane  
Diethyl ether  
Ethyl ether  
Methylene chloride  
Tetrahydrofuran  
Toluene  
1,1,1-Trichloroethane  
1,1,2-Trichloroethane  
Trichloroethane  
1,1,2,2-Tetrachloroethene  
Trichlorofluoromethane  
1,1,2-Trichlorotrifluoroethane  
Xylenes  
Vinyl Chloride

## **Remedial Actions**

### **Remedy Selection**

On June 28, 1991, a Record of Decision (ROD) which documented remedial actions for OU one (source control) was signed. The first operable unit addresses the source of the contamination by containing the wastes and contaminated soil on site. The function of this operable unit is to provide a final cover for the Dakhue Sanitary Landfill which will prevent or minimize groundwater contamination and risks associated with the exposure to the contaminated materials. The major components of the selected remedy for this operable unit include: Capping with a final cover system consisting of a gas control layer, a barrier layer of low permeable material, a drainage layer, topsoil cover and vegetation.

The remedy for the second operable unit was signed on June 30, 1993, and includes the following components. The institutional controls contained in Dakota County Ordinance No. 114 and Minnesota Rules 4725.2000 and 4725.4300 which restrict well development. A long-term groundwater monitoring program to : (1) ensure that contaminated groundwater is not migrating off-site; (2) assess trends in water quality in the Sand and Gravel aquifer; (3) verify that the deep aquifer is not affected; and (4) to provide adequate protection to aquatic life in Judicial Ditch No. 1 from adverse effects resulting from possible discharge of contaminated groundwater.

### **Remedy Implementation**

Final construction at Dakhue started on June 24, 1992. The work included construction of approximately 28 acres of final cover over the landfill. The landfill cover consisted of a gas vent system, a barrier layer of geosynthetic clay liner and geomembrane, subsurface drainage, and cover soils with vegetation. In addition, 13 groundwater monitoring wells were installed for the long-term groundwater monitoring system.

Presently, 13 groundwater monitoring wells are sampled three times per year to evaluate the impact of the final cover. This sampling is done under direction of the MPCA. Long term operation and maintenance of the landfill cover continues to be performed under the direction of the MPCA.

Construction activities occurred from June 24, 1992 until the completion of the final cover and site restoration on October 21, 1992. All final cover construction activities at the Dakhue landfill have been completed. All components of the final cover system are operational and functional. An inspection of the Site was conducted in the Spring of 1993, which verifies that the final vegetative cover has been established on the landfill.

On March 29, 1993, Barr Engineering submitted a Remedial Action Report signifying successful completion of construction activities. The report documents and discusses the construction of the 28 acre final landfill cover, surface water controls which included a sedimentation basin, and a site access road. The final cover consists of a gas vent system, a barrier layer of geosynthetic clay liner and geomembrane, subsurface drainage, and cover soils with vegetation.

The installation and development of the wells at the Site were completed the week ending August 13, 1993. The first round of sampling was completed the week ending August 26, 1993. Monitoring of groundwater will continue on a long term basis.

### **System Operation/Operation and Maintenance**

Long term operation and maintenance of the landfill cover and groundwater are being conducted by MPCA. Presently, 13 groundwater monitoring wells are sampled three times per year (spring, summer and fall events) to evaluate the impact of the final cover. This sampling is done under the direction of the MPCA.

**Table 2 - Annual System Operations/O.M. Costs**

<b>Dates</b>		<b>Total Cost</b>
<b>From</b>	<b>to</b>	
2000	2001	20,008
2001	2002	27,509
2002	2003	20,953

### **V. Progress Since the Last five-year Review**

The MPCA is working on the Dakhue Landfill passive gas venting system and it is being upgraded to an active gas extraction system to remediate landfill gas migration and remove additional VOCs from the waste before it can leach into the groundwater. The upgrade will consist of installing 25 new vertical gas extraction wells and connecting the wells with a buried pipe system that terminates at a new blower/flare skid. The landfill gas will be combusted in a new enclosed flare capable of destroying at least 98% of the VOCs that are present in the gas. Two new double walled underground gas condensate tanks will be installed to collect landfill gas condensate. The condensate will be pumped as needed and hauled to a municipal wastewater treatment facility for proper treatment and disposal. The existing passive gas venting system will be removed and the landfill cover barrier geomembrane patched to prevent water and air infiltration into the waste mass. A property boundary fence will be installed as part of this project.

### **VI. Five-year Review Process**

#### **Administrative Components**

This Five-Year Review Report was written and completed by EPA and based on the technical review of the Site by members of the Minnesota staff. This Five-Year Review Report was written by Gladys Beard of EPA.

From January 1, 2002 to February 18, 2004 the review team established the review schedule whose



components included:

- Community Involvement;
- Document Review;
- Data Review;
- Site Inspection;
- Local Interviews; and
- Five-Year Review Report Development and Review.

### **Community Involvement**

Notice will be made to the public announcing the Five-Year Review Report and providing a summary of Five-Year Review findings, protectiveness of the remedy, and advising the community where a copy of the review report can be found. This Five-Year Review Report can be found in the Site's Information Repository.

### **Document Review**

This five-year Review consisted of a review of relevant documents including O&M records, monitoring data, and the last Five-Year Review Report. All cleanup standards in the ROD were reviewed.

The following standards were identified as applicable or relevant and appropriate requirements (ARARs) in the 1991 and the 1993 RODs for the site and were reviewed for changes that could affect protectiveness. (See Attachment 1).

### **Data Review**

#### **Groundwater Monitoring**

Three (3) rounds of water quality samples were collected in 2000 by Interpoll Laboratories, Inc. at the Dakhue Landfill. The landfill monitoring system consists of 14 monitoring wells and no surface water sampling points. The judicial Ditch, last sampled in 2001, shows no impacts. A map showing the location of each of the monitoring points is presented in Figure 2.

Figure 3 & 4 have been prepared to show groundwater elevation trends for select monitoring wells. Review of groundwater data indicates that the groundwater flow direction in the surficial aquifer is to the south-southeast. Based upon the groundwater flow data, there was 1 upgradient well, 9 downgradient wells and 3 wells that are side gradient to the flow of groundwater from the fill area.

Groundwater samples have been collected by Interpoll Laboratories, Inc. for the past five years. Laboratory analyses of inorganic and organic parameters were performed by Minnesota Department of Health (MDH). Groundwater samples collected from monitoring wells have shown impacts from organic and inorganic parameters. The water quality analytical data obtained from the sampling events is divided into inorganic and organic sets. Water quality data collected from the existing monitoring system at the landfill site is tabulated in Table 2.

Graphs showing trends in water quality for select wells are included in Figures 5-8. The concentration trends for total VOCs are decreasing for all wells except MW-13 and MW-14. These wells, being a long distance from the fill area, would be expected to have a delayed peak in groundwater contamination levels after the remedy. Also, the contaminant levels at these wells are far below the drinking water standards (HRLs). Figures 9-16 contain graphs of specific compounds at select wells and compare these concentrations to their respective drinking water standards (HRLs) for five (5) of the most highly contaminated wells. As can be seen, several compounds, including Vinyl Chloride, Tetrachloromethane (PERC), and 1,2-DCA still exceed standards for some wells. It should be noted that the concentration trends for these compounds are continuing to decrease and these wells are screened directly adjacent to and/or beneath the landfill.

Two water quality sampling events occurred in 2001 and 2002 at the Dakhue Landfill. During each of the sampling events, Interpoll Laboratories collected samples from the groundwater monitoring wells for analysis by the Minnesota Department of Health Laboratories. Monitoring Well NW-12A was not sampled during the 2001 sampling event. Monitoring Well NW-8A was not sampled in 2002.

Water elevation trends are apparent in the data for the deep aquifer monitored by wells MW-3B, MW-8B and MW-10B. These wells have shown an increasing trend in water elevations. Groundwater elevations measured in Monitoring Wells Mw-10B and MW-8B have significantly increased, rising about 5 feet since 1995. Groundwater elevations measured in Monitoring Well MW-3B varied the least since 1995; however, an increasing trend is also apparent in this data. Monitoring Well MW-6A1 is the most upgradient water table monitoring well in the monitoring network, with a net increase of less than 2 feet since 1995. The other water table monitoring wells have also shown a similar increasing trend in the data collected to date. The groundwater elevation data is displayed graphically in Figures 2 and 3 located at the end of this document.

The results of the laboratory analyses of the groundwater samples collected during 2001 and 2002 indicate low level impacts to the groundwater from the Dakhue Landfill to the shallow groundwater. Impacts of both organic and inorganic analytes were reported. Figure 4, at the end of this document, show long term downward trends in total volatile organic compounds(VOCs) at the water table. This is indicative of continued improvements to groundwater quality beneath the Dakhue Landfill. Only Vinyl chloride had repeated exceedances of the health risk limit (HRL) during this reporting period. During this reporting period, vinyl chloride has a slightly decreasing trend in samples collected from Monitoring Well MW-8A (see Figure 5 at the end of this document). Historical exceedances of tetrachloroethene (PCE) indicate that natural degradation is likely occurring at this site. Vinyl chloride is often the final degradation product of PCE. The exceedances documented

in this reporting period are displayed in Table 2A.

**Table 2A**  
**Summary of Groundwater Exceedances**

Station ID	Date	Parameter	Result	Unit	HRL	MCL	Limit
NW-10A1	29-Aug-01	Arsenic	13	µg/L		10	10
MW-12A1	19-Nov-02	PCE	17	µg/L	7	5	7
MW-5A1	04-Jun-01	Vinyl Chloride	3.1	µg/L	0.2	2	0.2
	30-Aug-01	Arsenic	15	µg/L		10	10
	30-Aug-01	Vinyl Chloride	2.6	µg/L	0.2	2	0.2
	19-Nov-02	Vinyl Chloride	3.1	µg/L	0.2	2	0.2
MW-8A1	30-Aug-01	Mercury	62	µg/L		2	2
	30-Aug-01	Mercury	62	µg/L		2	2
	30-Aug-01	PCE	10	µg/L	7	5	7
	30-Aug-01	PCE	10	µg/L	7	5	7
MW-9A1	30-Aug-01	Manganese	2700	µg/L	1000		1000
MW-8A	30-Aug-01	Nitrate+N Nitrogen	11	µg/L	mg /L as N	10	10

#### Surface Water Monitoring

Judicial Ditch No. 1, located south has been monitored in the past and was found not to be impacted.

#### **Site Inspection**

A Site Inspection at the site was conducted in December 2003, by the State of Minnesota. The purpose of the inspection was to assess the protectiveness of the remedy, evaluate conditions of the cover, groundwater migration and the gas system.

## **Interviews**

In processing this report, U. S. EPA interviewed the MPCA to obtain information. None of the Minnesota staff was able to identify any concerns regarding the Site and there had not been any emergency responses at the Site.

## **VII. Technical Assessment**

### **Question A: Is the remedy functioning as intended by the decision documents?**

Yes, the review of documents, ARARS, risk assumptions, and the results of the site inspection indicates that the remedy is functioning as intended by the ROD. The stabilization and capping of the contaminated landfill have achieved the remedial objectives to minimize contaminants to groundwater and surface water and prevent direct contact with, or ingestion of, contaminants in soil and groundwater.

Operation and maintenance (O.M.) of the cap and groundwater have been effective. O.M. annual costs are consistent with original estimates and there are no indications of any difficulties with the remedy.

No activities were observed that would have violated the institutional controls. The cap and the surrounding area were undisturbed, and no new uses of groundwater were observed. A fence around the Site is being installed.

### **Question B: Are the exposure assumptions, toxicity data cleanup levels and remedial action objectives (rads) used at the time of the remedy selection still valid?**

#### **Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics**

Yes, the exposure assumptions used to develop the Human Health Risk Assessment included both current exposures (older child trespasser, adult trespasser) and potential future exposures (young and older future child resident, future adult resident and future adult worker). There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment. These assumptions are considered to be conservative and reasonable in evaluating risk and developing risk-based cleanup levels. No change to these assumptions, or the cleanup levels developed from them is warranted. There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy. The remedy is progressing as expected and it is expected that all groundwater cleanup levels will be met within approximately the time frame stated in the ROD.

### **Question C: Has any other information come to light that could call into question the protectiveness of the remedy?**

No ecological targets were identified during the baseline risk assessment and none were identified

during the five-year review, and therefore monitoring of ecological targets is not necessary. All groundwater and surface water samples analyzed found no contamination of wetlands or surface water. No weather related events have affected the protectiveness of the remedies. There is no other information that calls into question the protectiveness of the remedies. There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

#### Technical Assessment Summary

According to the data reviewed, the site inspection, and the interviews, the remedies are functioning as intended by the ROD. There are no changes in the physical conditions of the site that would affect the protectiveness of the remedy. There have been no changes in the toxicity factors for the contaminants of concern that were used in the baseline risk assessment, and there have been no changes to the standardized risk assessment methodology that could affect the protectiveness of the remedies. There is no other information that calls into question the protectiveness of the remedies.

### **VIII. Issues**

**Table 3: Issues**

<b>Issues</b>	<b>Affects current Protectiveness (Y/N)</b>	<b>Affects future Protectiveness (Y/N)</b>
Passive gas system needs upgrades	N	Y
Landfill needs property fence	N	Y
Underground gas collection system needs to be installed to collect landfill gas	N	Y
Landfill needs patching	N	Y
Finish all upgrades	N	Y

### **IX. Recommendations and Follow-up Actions**

**Table 4: Recommendations and Follow-up Actions**

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Upgrades at the landfill	All upgrades will be finish at the site	MPCA	MPCA	2004	N	Y
Removed existing passive gas system	The passive gas system will be changed to active gas system	MPCA	MPCA	2004	N	Y
Install property boundary fence	The fence will be installed to show property boundary	MPCA	MPCA	2004	N	Y

## **X. Protectiveness Statement(s)**

The remedy is protective in the short term of human health and the environment. All immediate threats at the site have been addressed. All threats at the Site have been addressed with deed restrictions, Site capping and the gas collection system.

Long term protectiveness of the remedial action will be verified by conducting site monitoring of groundwater, surface water and the landfill.

## **XI. Next Review**

The next five-year review for the Site will be completed five years from this report on March 15, 2009.

# Dakhue Sanitary Landfill Superfund Site Dakhue County, Minnesota

1) State

2) City of Cannon Falls

3) Dakhue Superfund Site

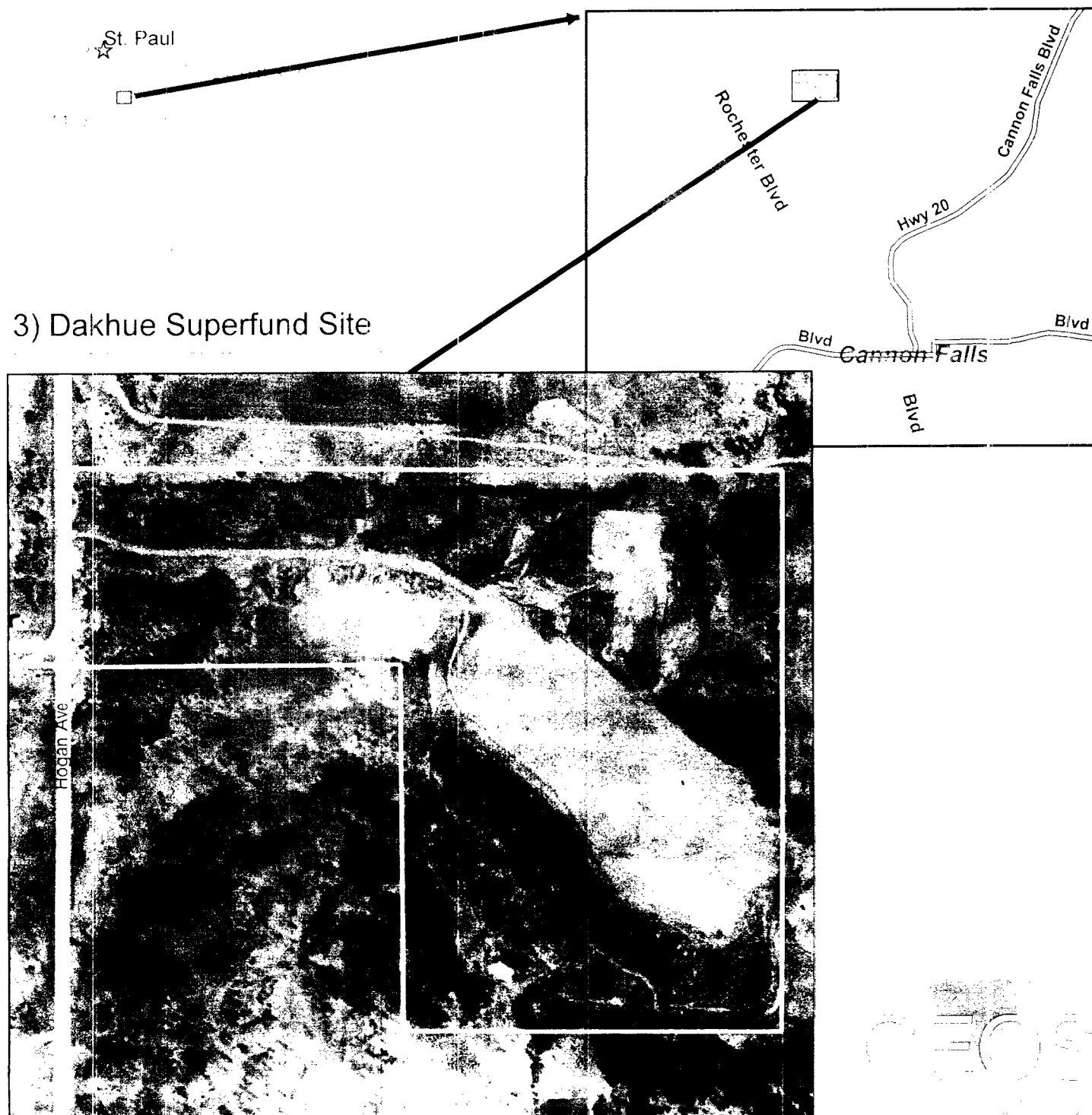
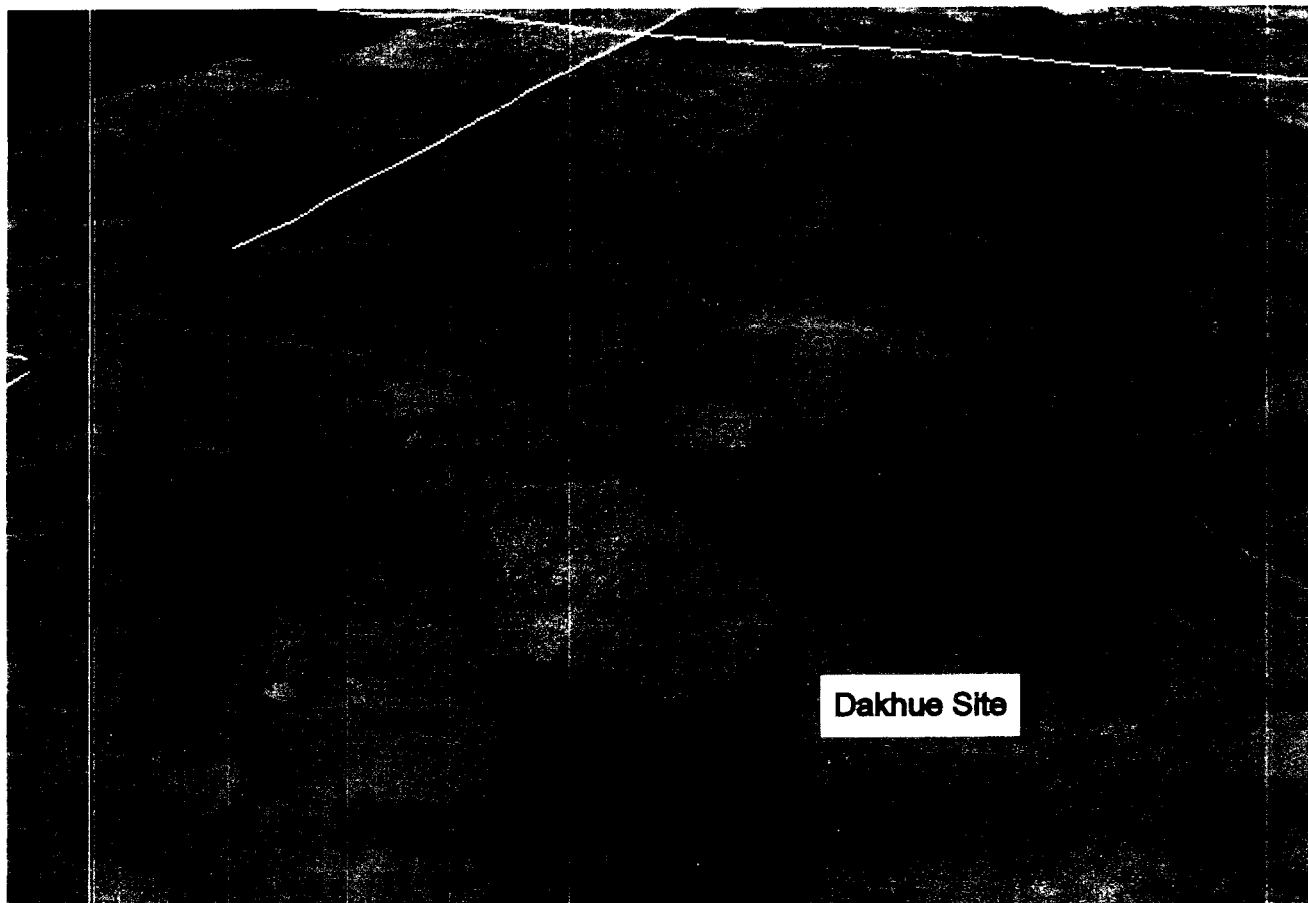











Figure 1

# Dakhue Sanitary Landfill Superfund Site

## 3D Surface Terrain Model



### Elevation in Feet

	318 - 329
	308 - 318
	297 - 308
	287 - 297
	276 - 287
	266 - 276
	255 - 266
	245 - 255
	235 - 245

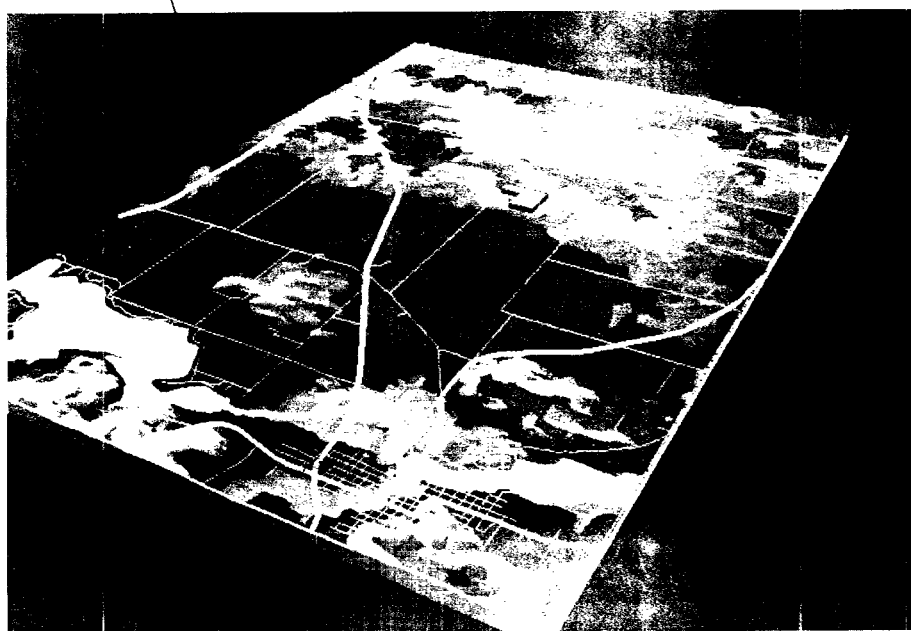




TABLE 1

Alternatives Summary  
Groundwater Migration Control Operable Unit  
Dakhue Sanitary Landfill Site

Alternative 1: No Action

Alternative 2: Monitoring, Water Supply Cost Participation

Alternative 3A: Monitoring, Extraction Wells to Contain Future Contaminant Migration from the Landfill, Air Stripping, Iron and Manganese Removal, Discharge to Stormwater Retention Basin

Alternative 3B: Monitoring, Extraction Wells to Remediate Entire Plume, Air Stripping, Discharge to Stormwater Retention Basin

Alternative 4A: Monitoring, Extraction Wells to Contain Future Contaminant Migration from the Landfill, Carbon Adsorption, Iron and Manganese Removal, Discharge to Stormwater Retention Basin

Alternative 4B: Monitoring, Extraction Wells to Remediate Entire Plume, Carbon Adsorption, Discharge to Stormwater Retention Basin

Alternative 5A: Monitoring, Extraction Wells to Contain Future Contaminant Migration from the Landfill, Photolysis/Chemical Oxidation, Iron and Manganese Removal, Discharge to Stormwater Retention Basin

Alternative 5B: Monitoring, Extraction Wells to Remediate Entire Plume, Photolysis/Chemical Oxidation, Discharge to Stormwater Retention Basin

The source control alternatives are:

Alternative 1: No Action

Alternative 2: Cover system satisfying Minnesota Rules for Municipal landfill closure with clay barrier layer.

Alternative 3: Cover system satisfying Minnesota Rules for Municipal landfill closure with two feet additional frost protection.

Alternative 4: RCRA cover system for hazardous waste facility closure.



## Dakhue SLF Water Levels@ Select Wells

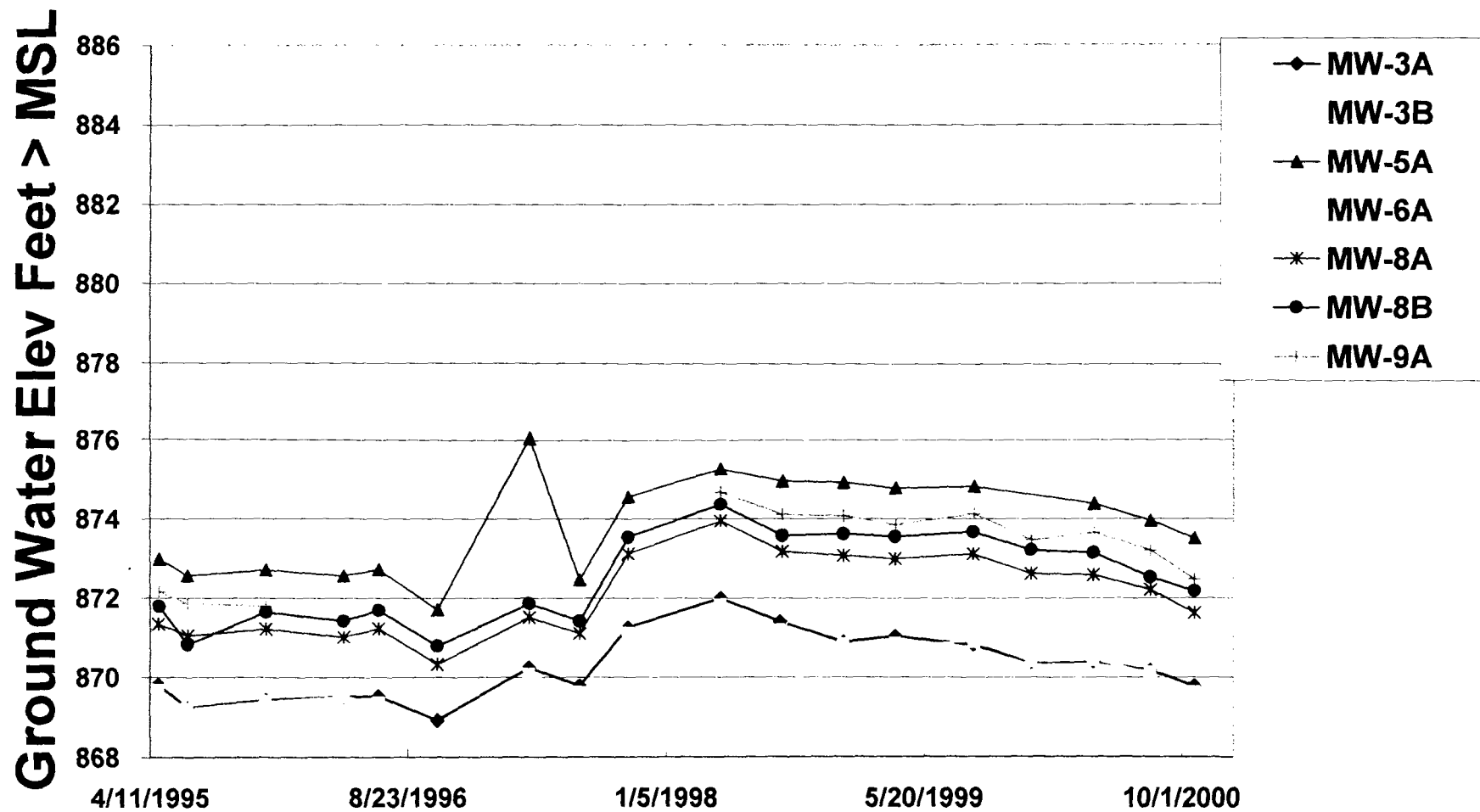


Figure 3

## Dakhue SLF Ground Water Levels

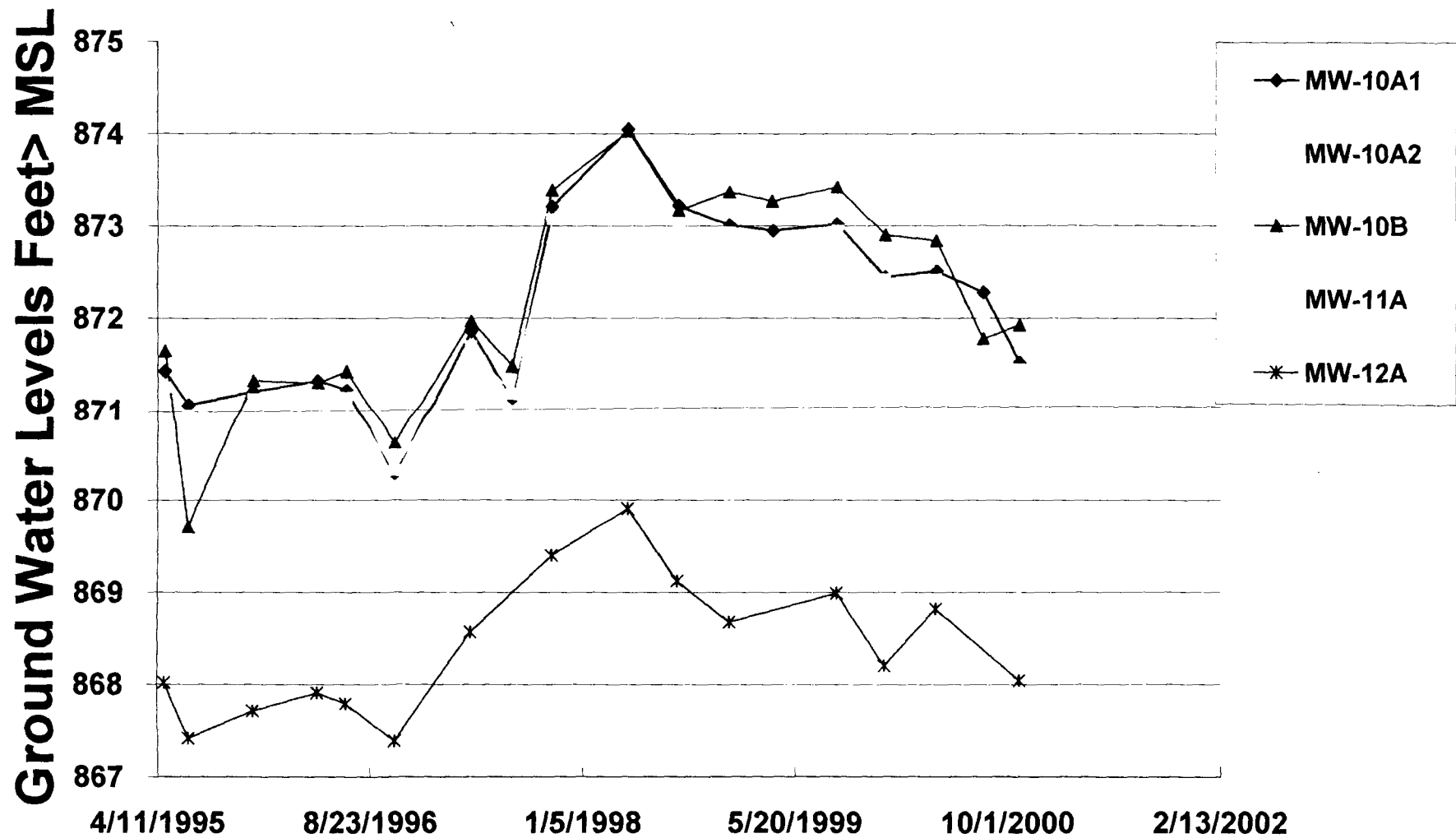


Figure 4

## Dakhue SLF Total VOCs @ Select Wells

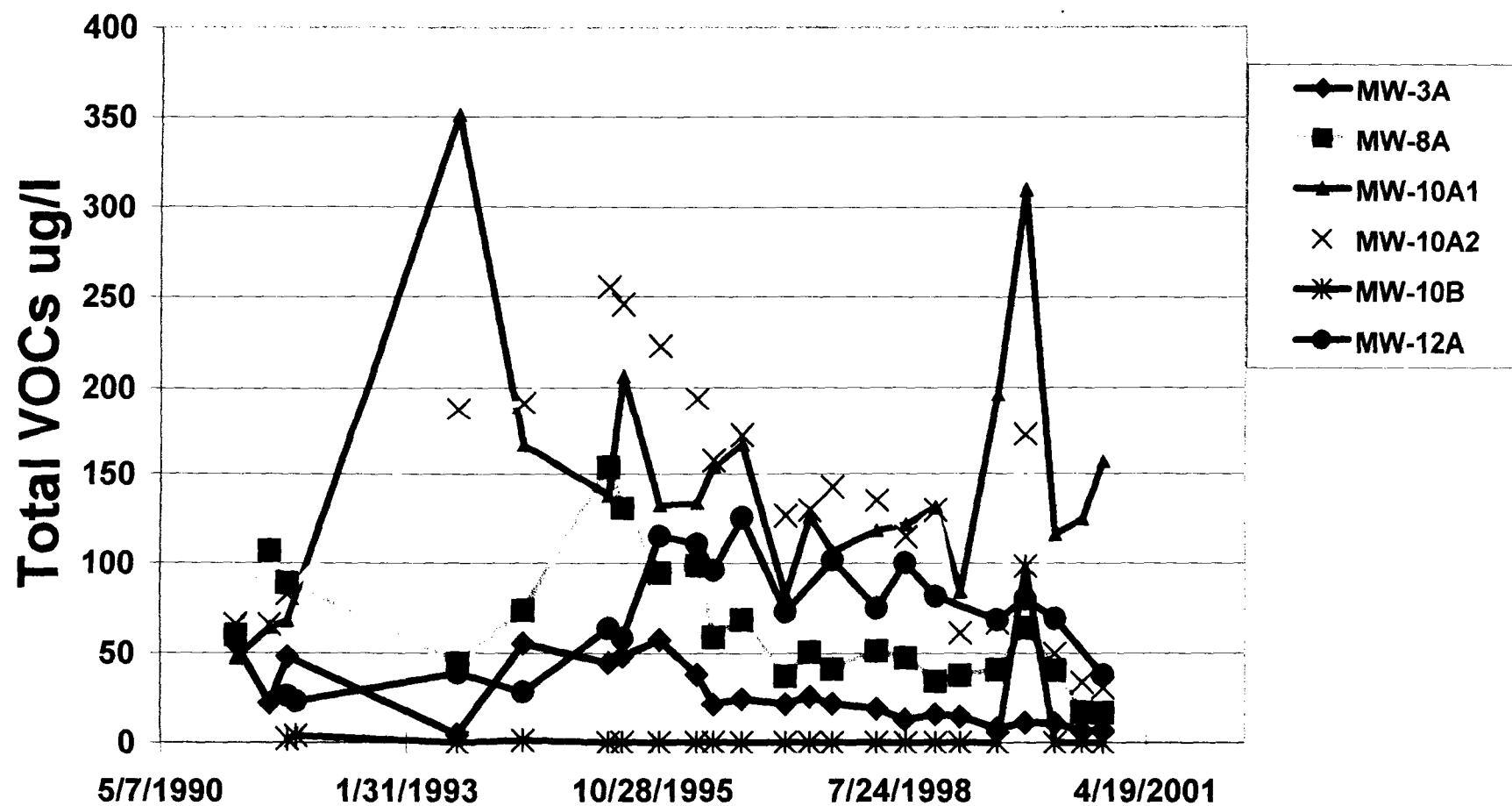


Figure 5

## Dakhue SLF Total VOCs @ Select Wells

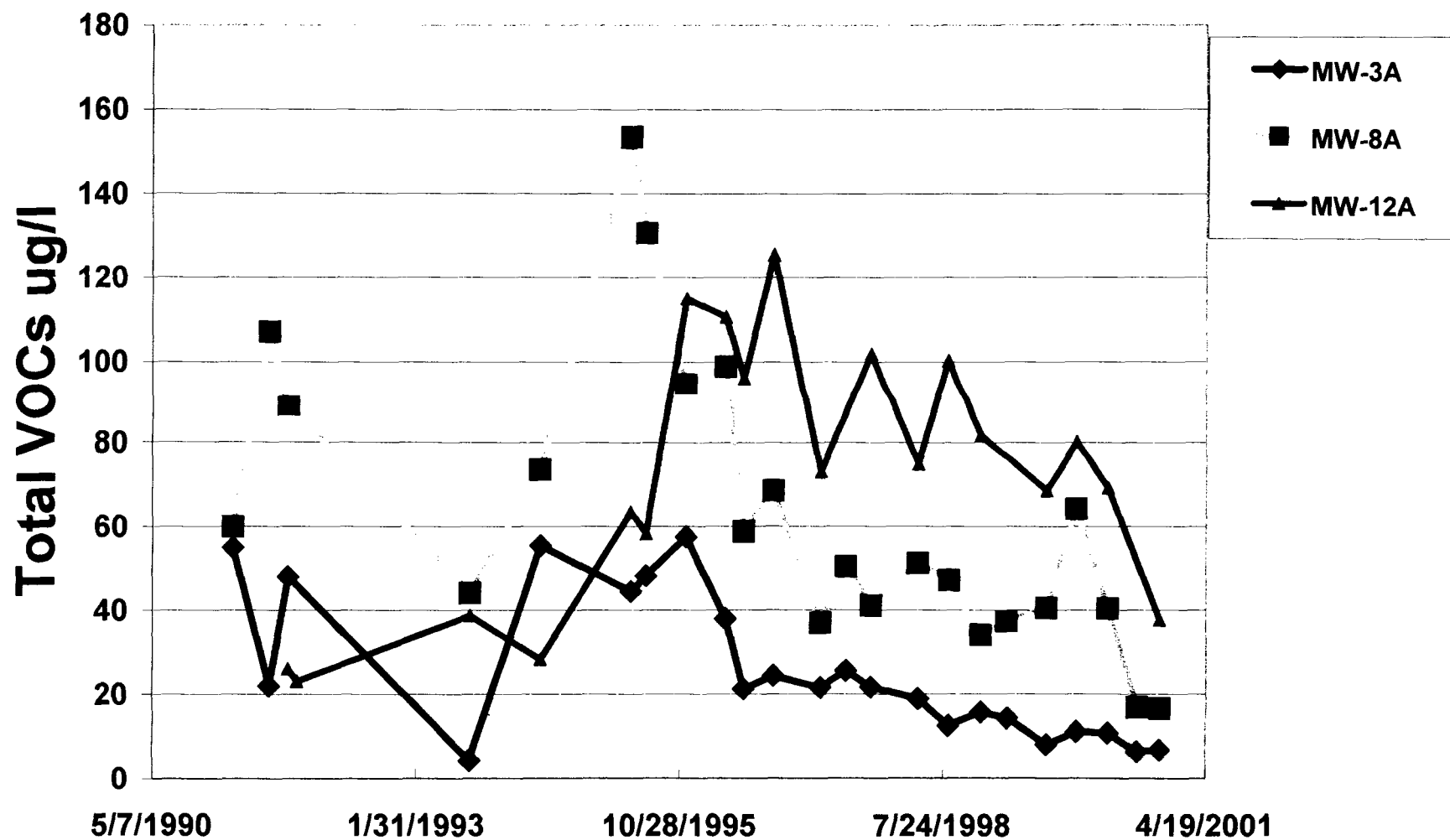


Figure 6

## Dakhue SLF Total VOCs @ Select Wells

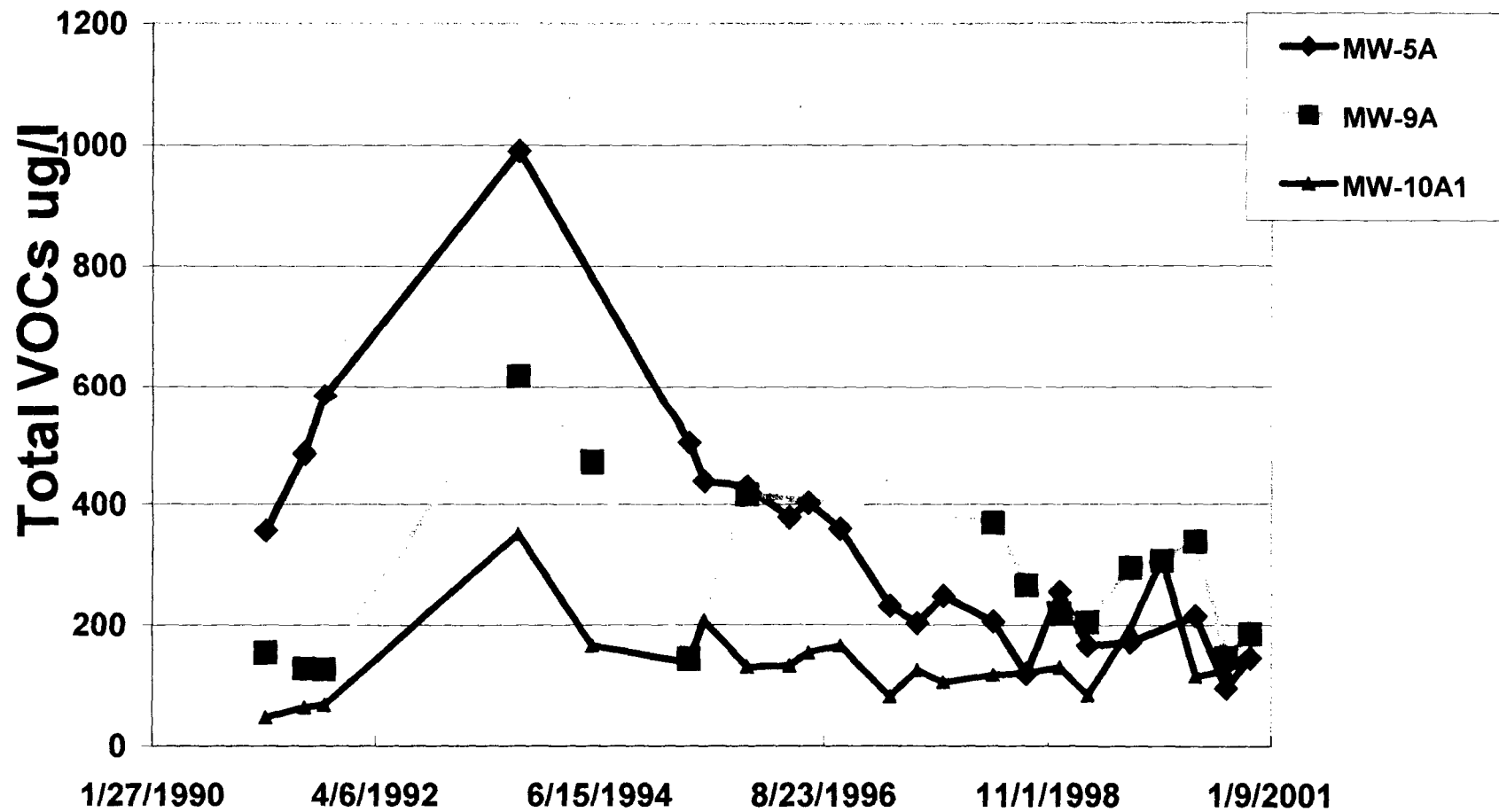


Figure 7

## Dakhue SLF Total VOCs @ Select Wells

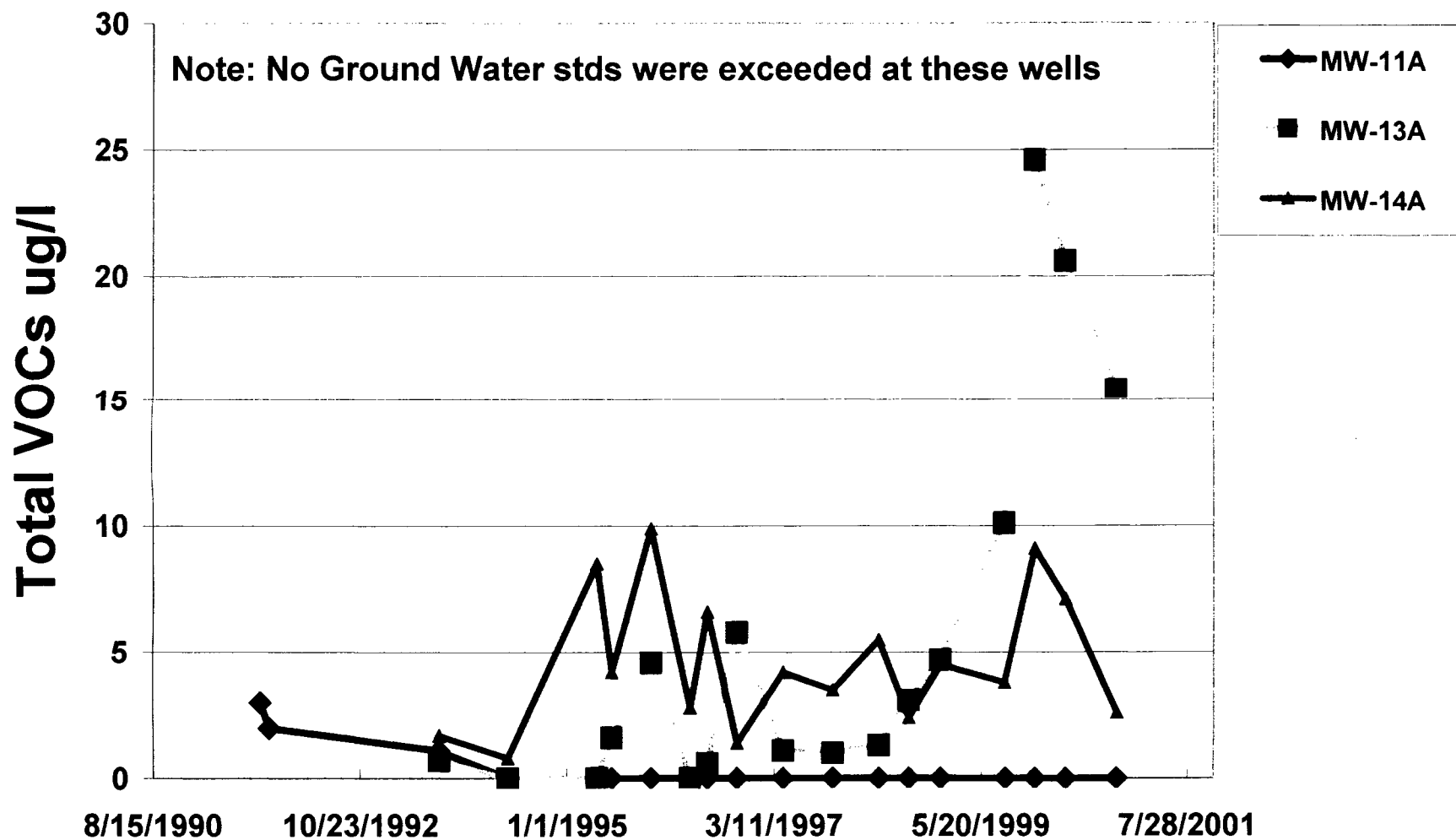


Figure 8



# Dakhue MW-3A Select Compound Trends

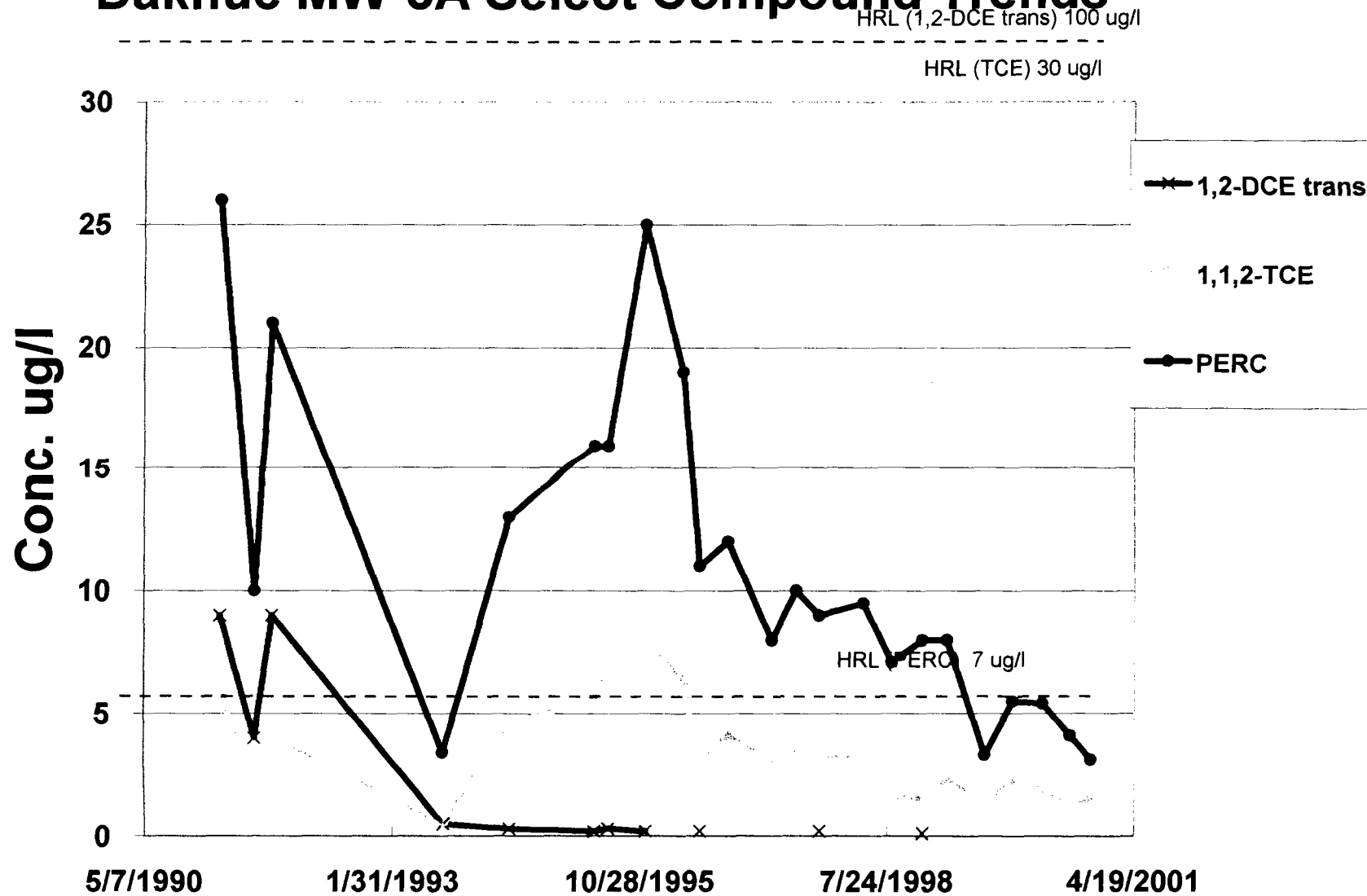


Figure 9

## Dakhue SLF MW-5A Conc. Trends for Select Compounds

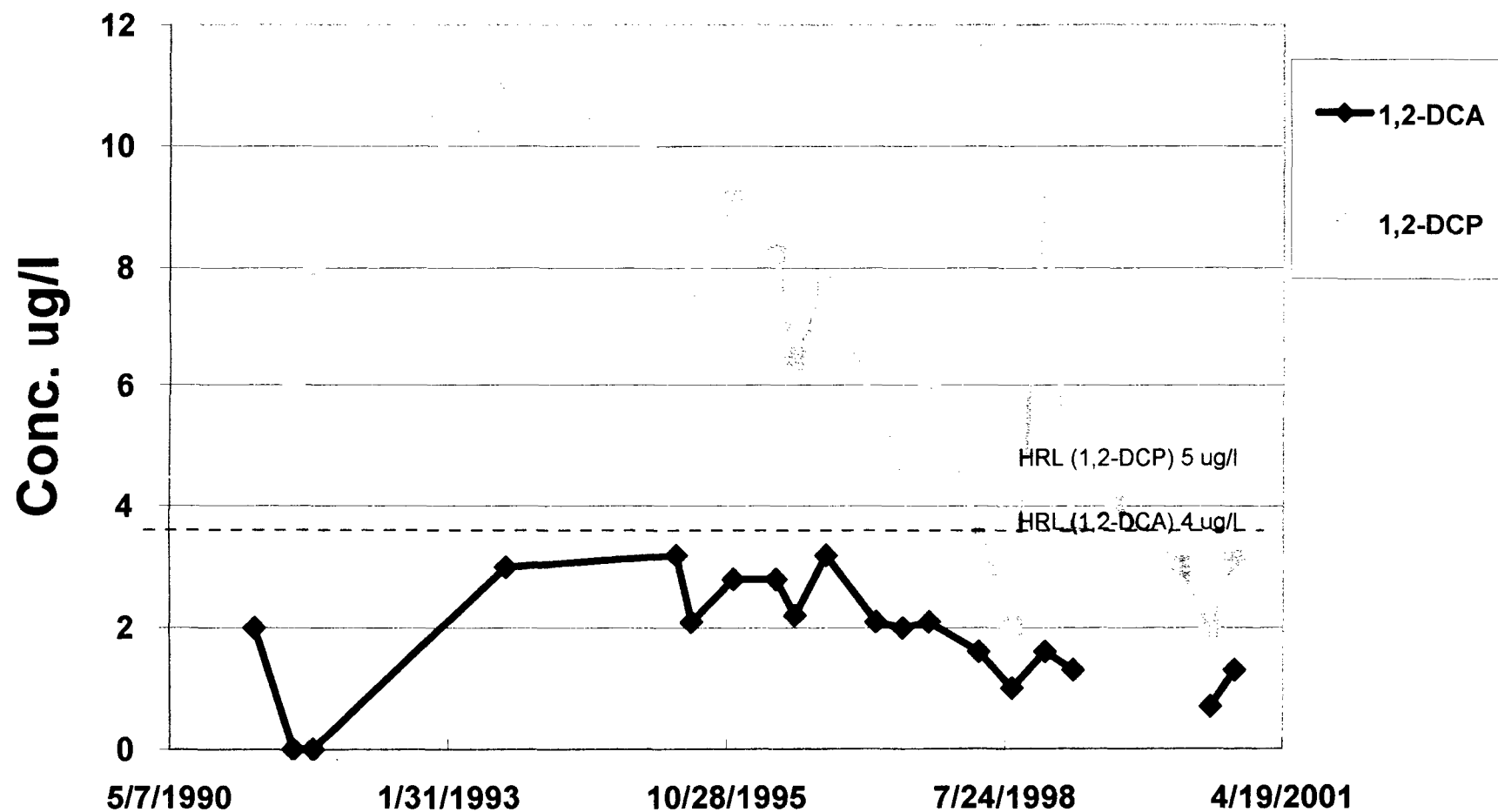


Figure 10

# Dakhue SLF MW-5 Conc. Trends for Select Compounds

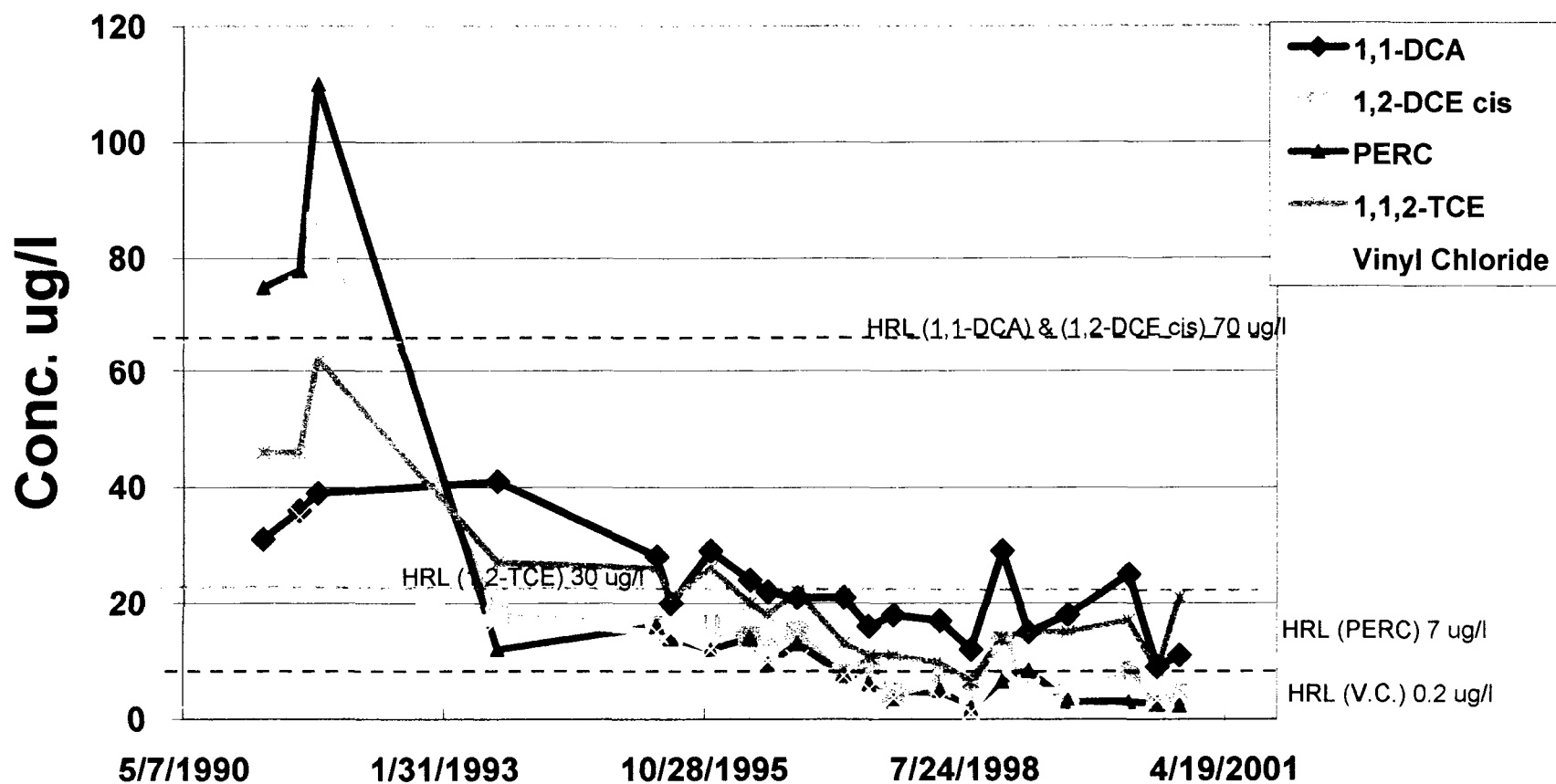


Figure 11

# Dakhue MW-10A(1) Select Compound Trends

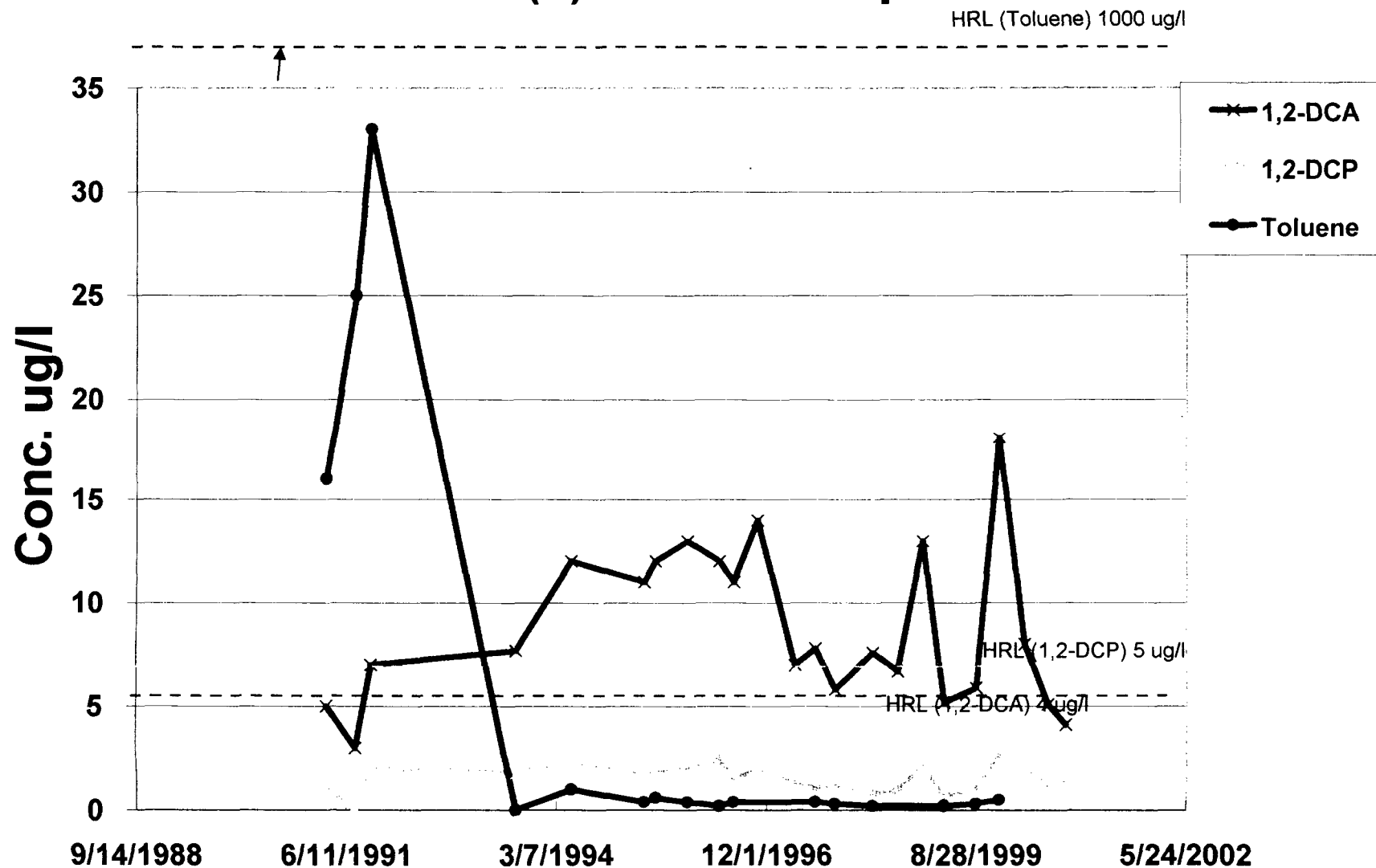


Figure 12

## Dakhue MW-10A(2) Conc. Trends for Select Compounds

HRL (TCE) 30 ug/l

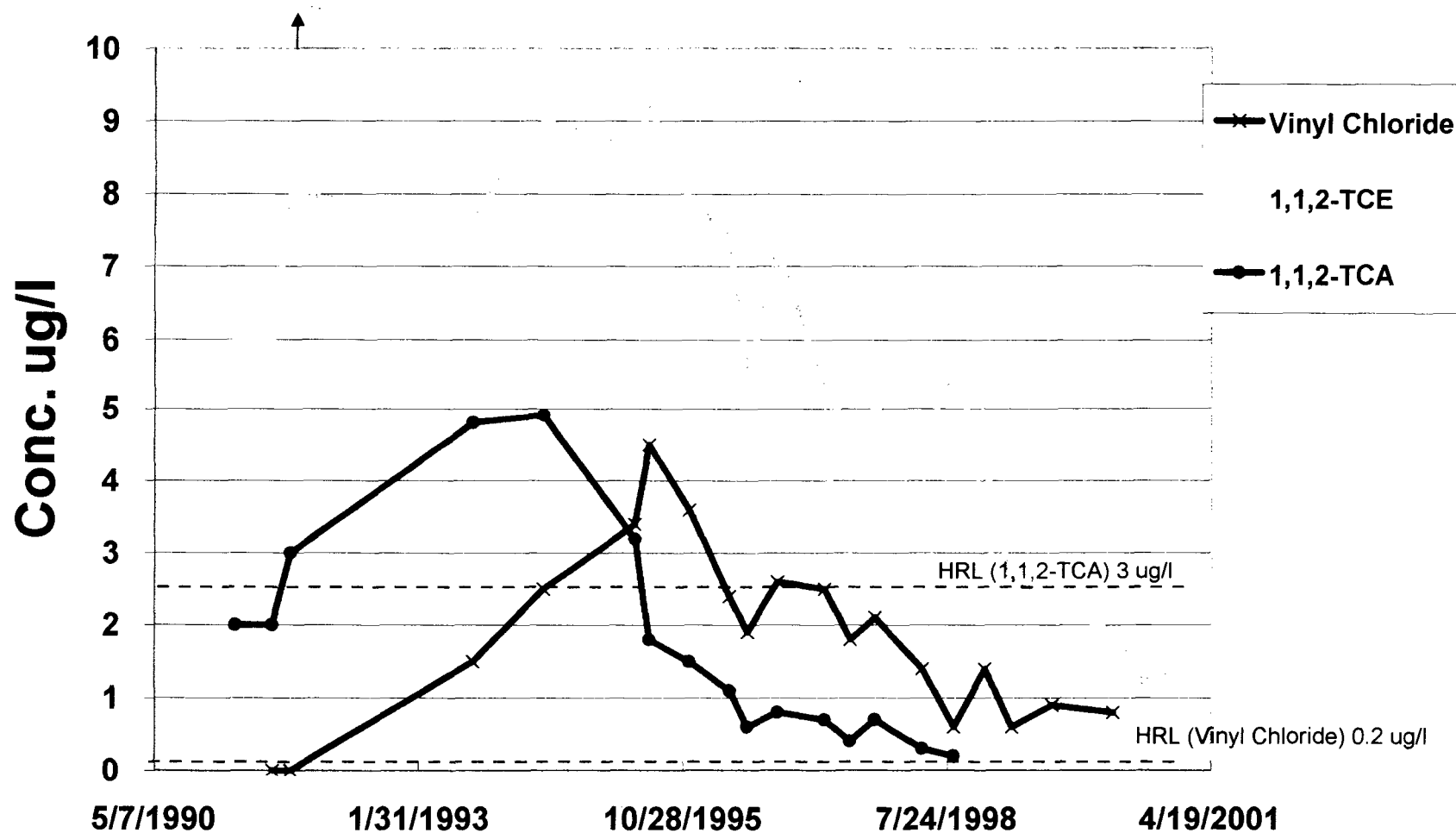


Figure 13

# Dakhue MW-10A(2) Conc. Trends for Select Compounds

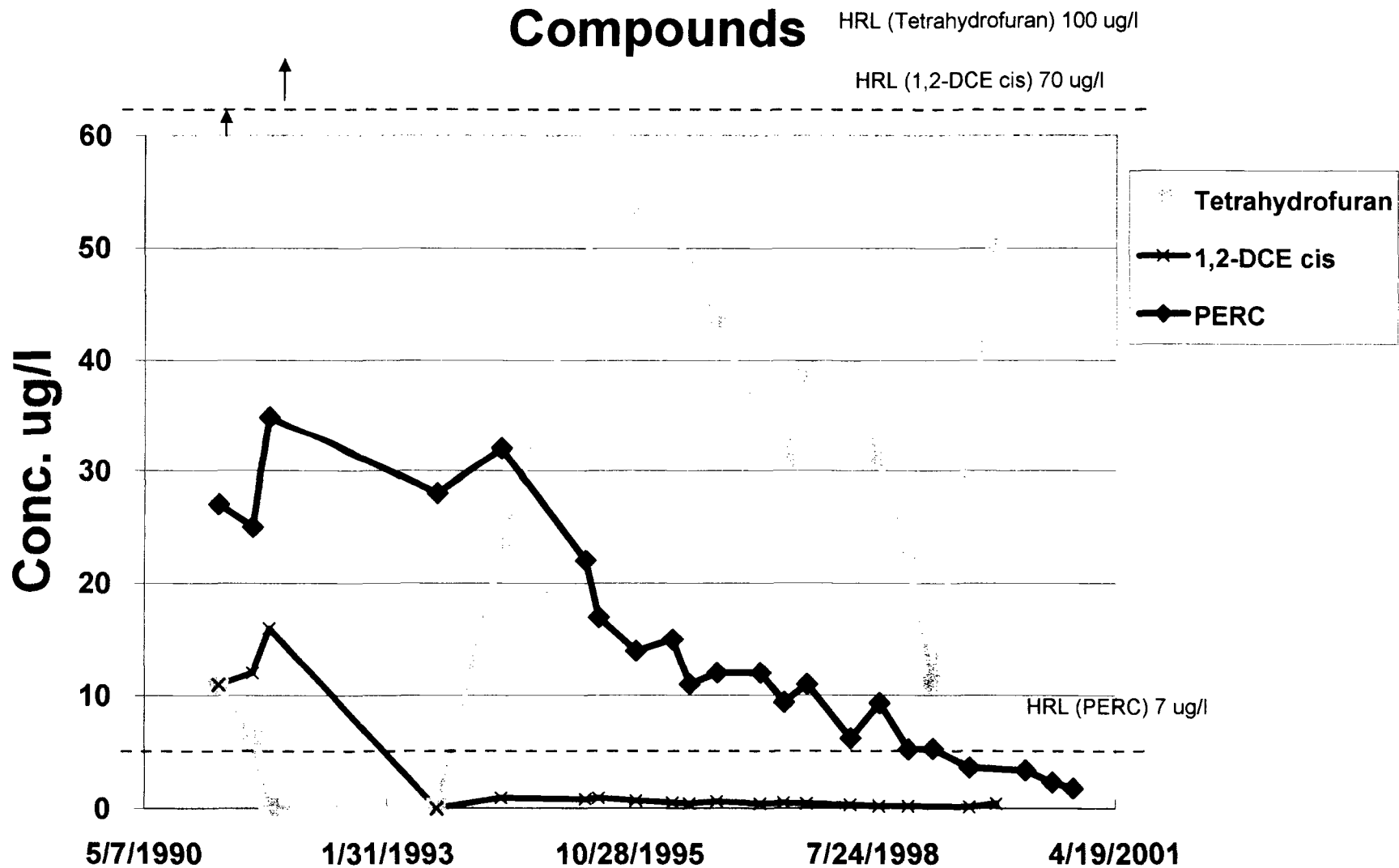


Figure 14

# Dakhue MW-12A Conc. Trends for Select Compounds

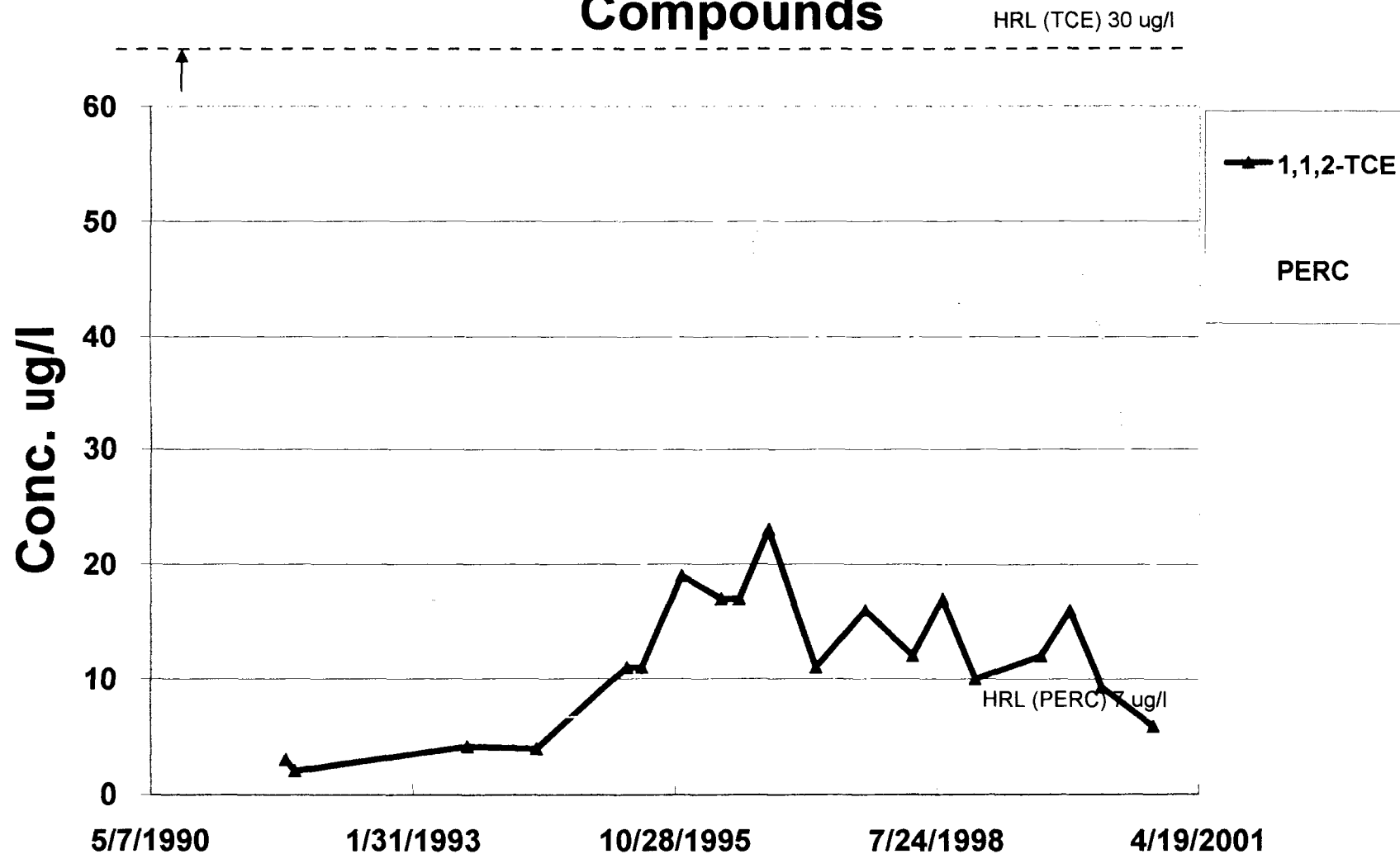


Figure 15

# Dakhue MW-12A Conc. Trends for Select Compounds

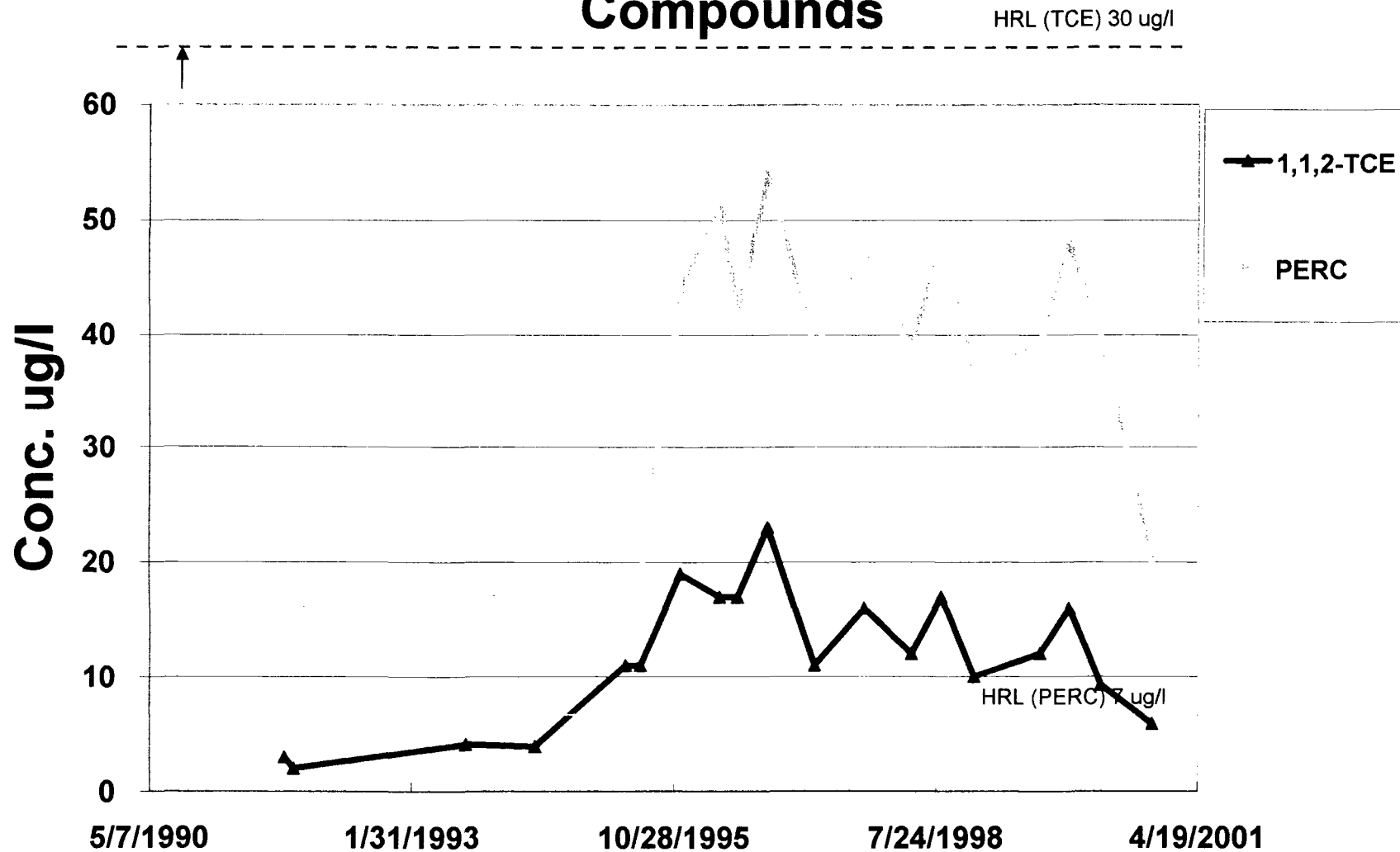


Figure 15



## Dakhue SLF MW-8A Conc. Trends for Select Compounds

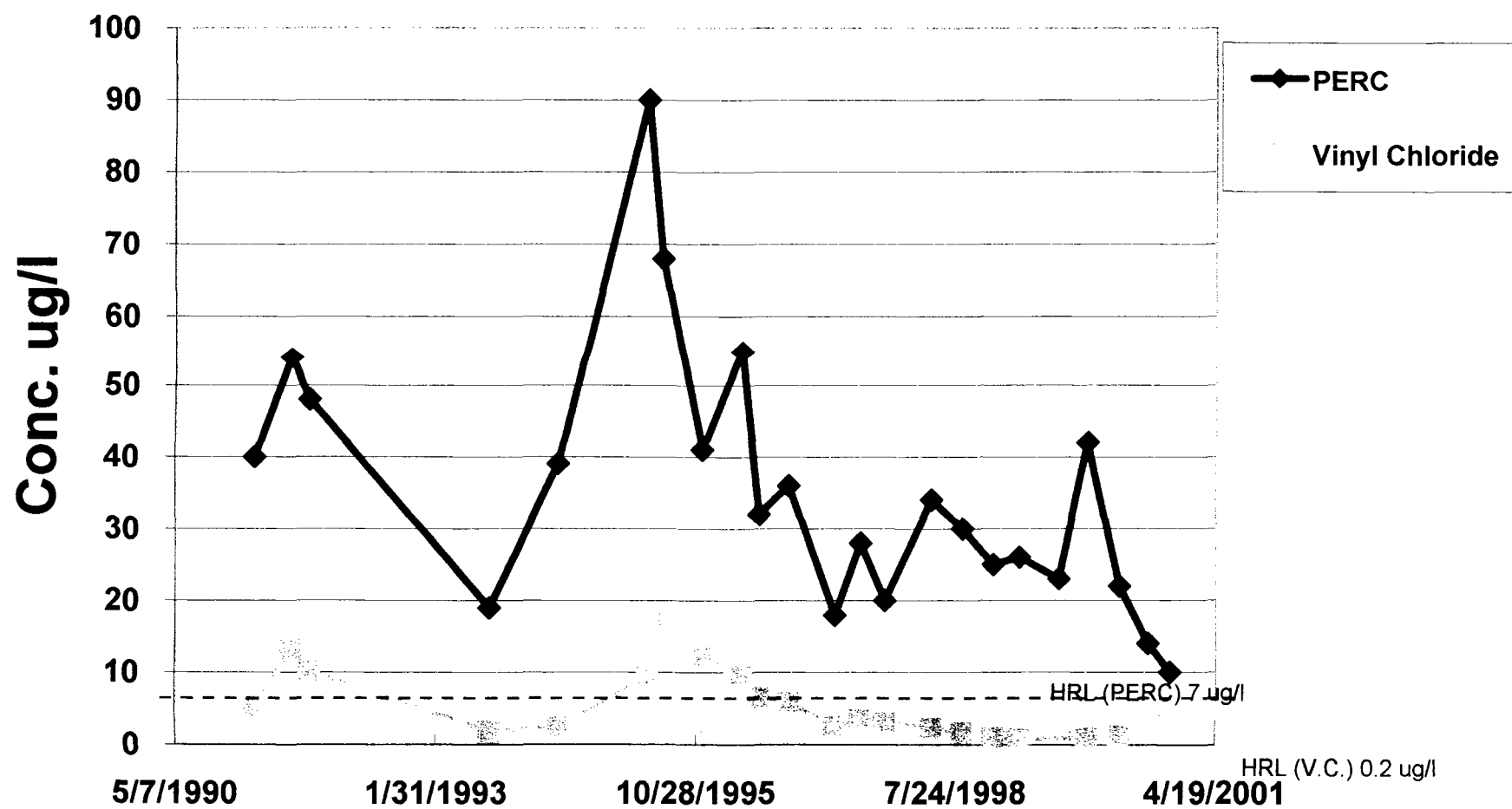


Figure 16

## Dakhue SLF MW-8A Conc. Trends for Select Compounds

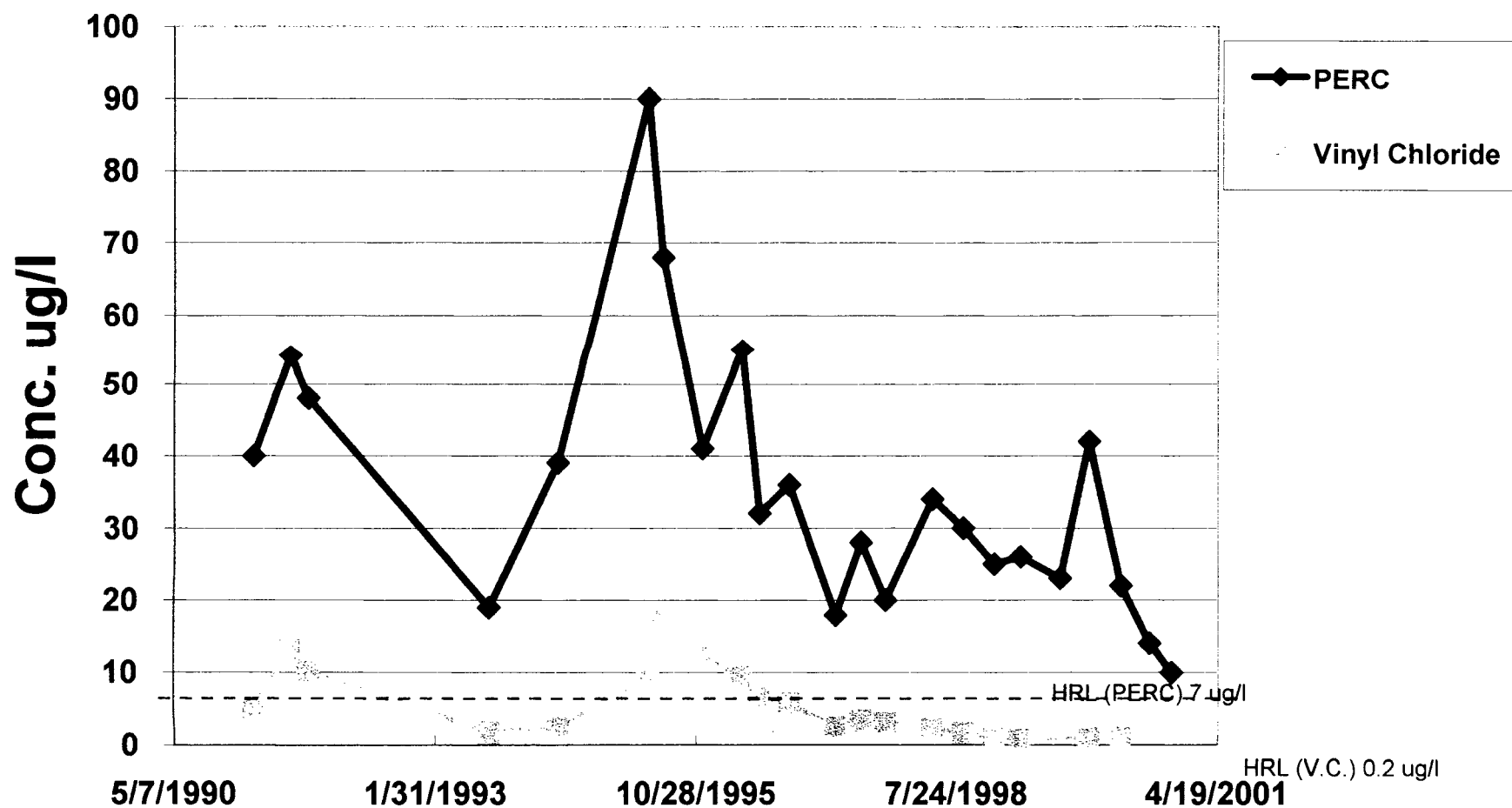


Figure 16

## Dakhue SLF Total VOCs @ Select Wells

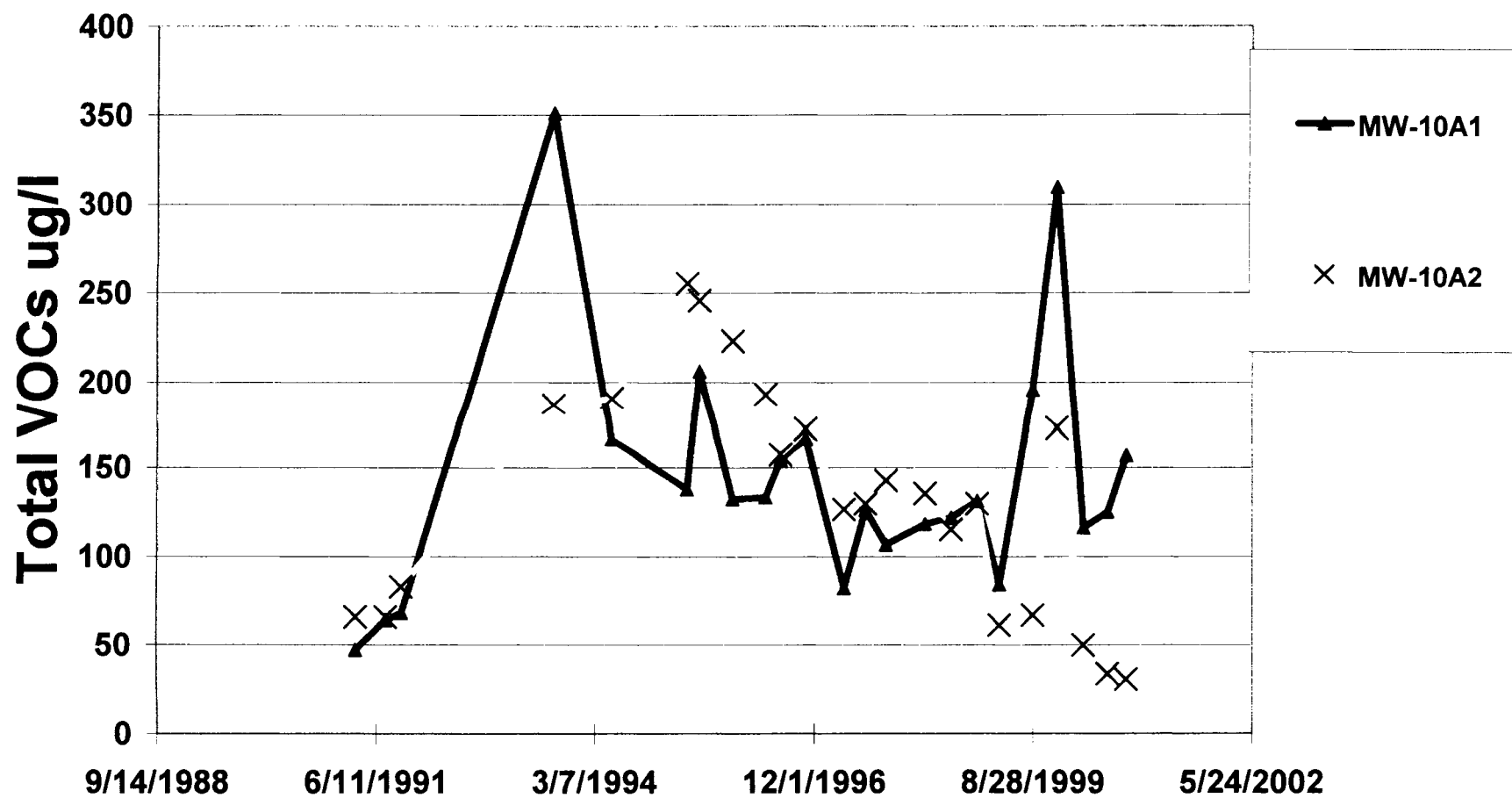


Figure 2

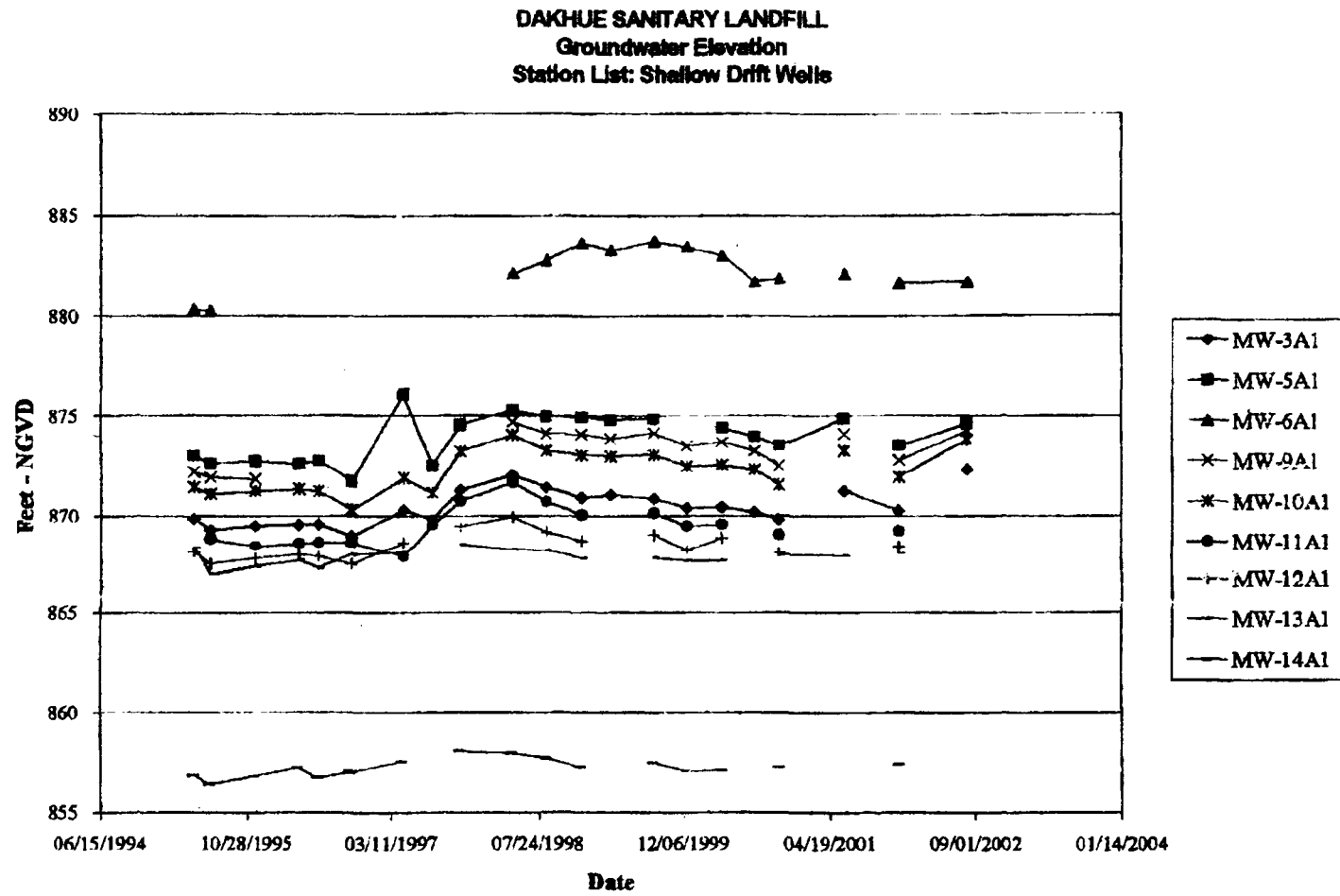


Figure 3

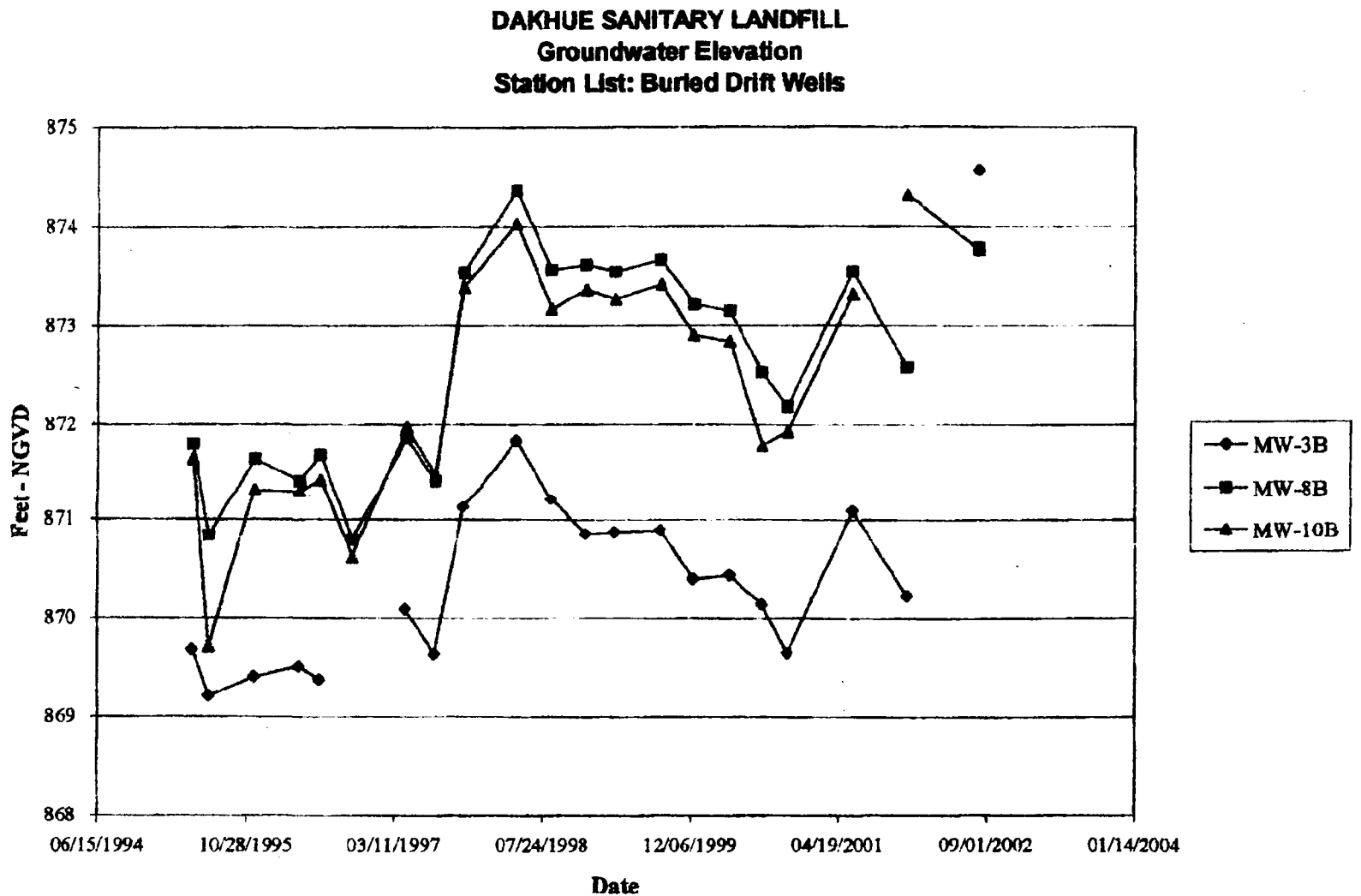


Figure 4

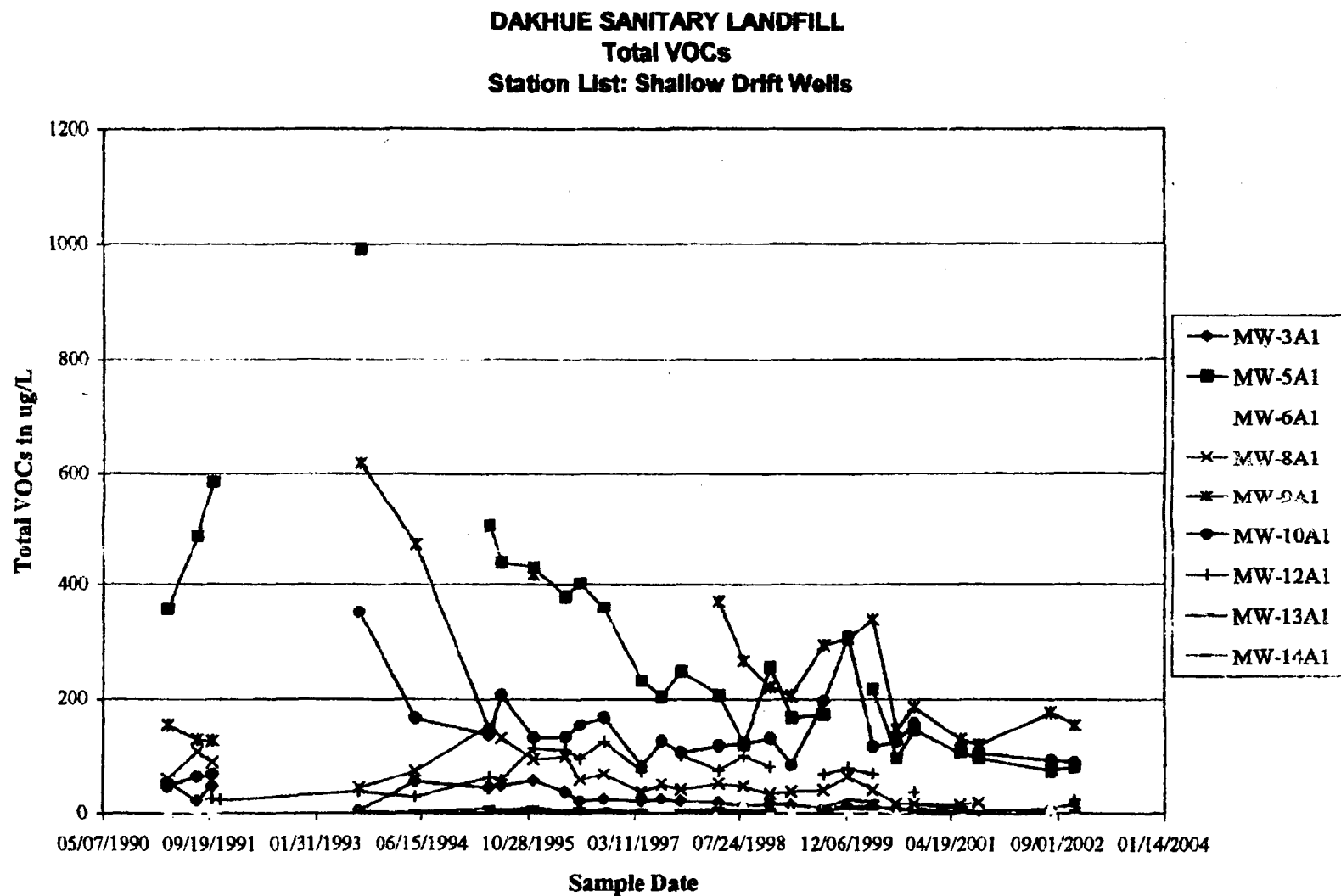


Figure 5

